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THE BRITISH AND EASTERN CONTINENTS edition of the Railroad Gazette is published each Friday at Queen Anne's Chambers, Westminster, London. It consists of most of the reading pages and all of the advertisement pages of the Railroad Gazette, together with additional British and foreign matter, and is issued under the name Transport and Railroad Gazette.

CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

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The salient fact concerning the distressing rear collision at Emsworth, Pa., on Friday evening last, is that it occurred on one of the best roads and on a division thoroughly well signaled. The fact that the speed of the second train was 40 or 50 miles an hour when it struck, instead of 10 or 15, as, by good luck, is usually the case in such occurrences, is bad enough; and the burning of killed and injured by a fire is an added horror calling for a whole sermon, if sermons were appropriate; but the uselessness of the signals is more disquieting than all the rest. A somewhat similar collision occurred under manual block signaling at Cudworth, England, in January, killing six passengers. The engineman trusted to the fireman to keep lookout in a dense fog, and a signal was passed. The engineman was somewhat new to that run, and there was much discussion as to whether the trackmen who should have been on hand to give torpedo signals were promptly called (it was 3 a. m.). As in countless previous cases, however, these and other collateral questions serve mainly to becloud the main issue, which is, simply, whether there is any way to secure a higher degree of vigilance and responsibility in enginemen. We add responsibility to vigilance because failure to see signals promptly is one evil and failure to exactly obey them, after they have been seen, is another. Many enginemen, otherwise careful, lack the moral firmness to refrain from taking little risks, though they mean never to take a serious one. The cure for this moral weakness is the systematic inspection, of which we have seen examples on the Chicago & North Western and the Southern Pacific. No superintendent can fairly omit such inspection unless he is willing to take the weak position of throwing the final responsibility for the safety of his trains on the inscrutable "human equation"—a phrase that is much more appropriate in the speech of a jury exhorter than in the practice of a wideawake superintendent. At this writing it appears likely that the cause of the Emsworth collision will fall into this last-mentioned class: the engineman had for several blocks been running at high speed close to the home signals, and they had cleared for him; but finally he encountered one that did not clear, and he was not prepared for it. He took a terrible risk for the sake of a possible saving of one or two minutes' time; and this for no definable reason except that he regarded as still more terrible the ordeal of explaining to the superintendent a delay of two minutes.

THE INTERBOROUGH STRIKE.

The Interborough strike, which began March 7, and is in full swing at the time we go to press, came as a great surprise to the people of New York, in spite of the sudden warning in the papers the night before. But the strike was probably quite inevitable. The employees of the subway in particular have been exceedingly restless ever since the line was opened, under the excited leadership of Jencks, the local head of the engineer-motormen's association, and of Pepper, of the Amalgamated Association of Street and Electric Railway Employees, representing the guards, ticket choppers, etc. The time for the management to have taken a strong position was last fall, while the organization of the subway was being effected, but Mr. Belmont was unfortunately handicapped by his political affiliations, prior to the elections, and the company granted a series of concessions which unmistakably left the impression that it was morally weak, and unable to resist the demands of the labor leaders. With regard to the character of the employees who are on strike, the motormen, in particular, are a fine, steady set of men, mostly transferred from their former positions of locomotive engineers. They received wages of $3.50 a day, maximum, and worked nine hours. The guards and other employees, apart from the motormen, received much lower wages and were not as good material, but the seniors among them had performed faithful service on the elevated lines for years, without any real complaint or dissatisfaction. But ever since the subway was opened and the Interborough workers were unionized, the demands have been loud and continuous, following the usual development of insisting more and more, as time went on, that the union should have the privilege of holding the company to an inflexible code of rules of the union's own making. This was the proximate cause of the strike. The demands of the strikers, embodied in the following statement, appear as a wholly trivial cause for tying up the mainstays of the transportation system of the greatest city in the country:

That the present physical examination now in force against motormen and other employees shall be eliminated and a practical road test substituted instead; above to take effect Jan. 1, 1905.

A day's work for motormen and other trainmen to be nine hours or less; motormen's mileage not to exceed 100 miles a day.

Relay for motormen, when headway is less than six minutes, should be allowed at southern terminals, loop or no loop.

All road work on trains with or without passengers shall be done by qualified motormen.

For all employees excepting tower switchmen nine hours shall constitute a day's work, with time and a half for overtime.

Tower switchmen, eight hours or less to constitute a day's work, with one day off duty a month with pay; time and a half for over time.

Ten per cent. increase in pay for all employees excepting motormen.

The provisions as to duration of the working day are substantially the same as are now in force; the objectionable demands are the familiar protest against the physical examination, which has been a sore point with the men from the first; the ten per cent. increase for all employees except motormen, and, most of all, the inflexibility of the code, which prompted the statement by the company that the struggle was to determine whether the road was to be run by the management or by the unions. It will be recalled that when the wages of the motormen were fixed, last fall, at $3.50, instead of at $3.00, as the company proposed, the motormen entered into a cast-iron agreement not to strike for three years; an agreement which they have observed for approximately six months! This is an additional cause of bitterness to the management. The men claim that the company absolved them by its failure to live up to its part of the agreement, but they make no specific charges; only the broad generalization which is always brought forward in such cases, and

leads to the total lack of confidence in trade union agreements that unfortunately prevails in the minds of employers of labor. It therefore seems apparent that the unions must be beaten, and beaten badly, as they were in the New York Central strike in 1890, before New York rapid transit can be restored on a permanent basis. And New York City is a good place for such a strike, because the police force, when bravery and efficiency are at stake and there is no question of graft, is a model organization. It knows how to handle riots, and maintains the impartiality of strict discipline.

But meantime the traffic situation is intolerable. It is probable that few people living in other sections of the country have any conception how congested the long, narrow island can get when it depends on surface transit. With all the elevated and subway lines working at their maximum capacity, the surface cars are crowded to the rails each day during rush hours—and the elevated and subway lines carry approximately eleven hundred thousand passengers a day! That means about 550,000 additional people must either get on those surface cars each morning and night, or else find some other way to make their journey of four, six, eight, or twelve miles. The situation has been productive both of ingenuity and of exercise. The avenues are filled with cabs, carrying a heavy overload at rates quite prohibitive to all but the capitalist. Trucks are changing from freight business to passenger business, and rival the efforts of the Fifth avenue stage line, which is running what might be described as the most laughable line of vehicles ever seen in New York streets. The interesting and characteristic feature of it all is the temper of the crowd, which is absolutely good-natured and long-suffering.

With the assistance of James Farley and his ragamuffin crowd of strike breakers the Interborough Company is keeping its lines open. The first thing done was to protect the windows of the motormen's compartments with heavy wire screens, and to remove the emergency stop levers from the cars, but thus far there has been no violence; nothing more than an occasional sporadic outburst of rowdyism, quickly suppressed. Much praise is due the management for its prompt and efficient action in keeping the wheels turning, but it is exceedingly dangerous to allow passengers on the trains while new men are being broken in. Some of the new motormen have had experience, but the scatterbrained way in which the greenhorns handle the controllers and their ignorance and awe of the air apparatus while in charge of heavy trains full of passengers is in painful contrast to the weeks of training which preceded the public opening of the subway. Expresses were started on Wednesday in charge of men with evident experience, but the serious rear collision at Twenty-third street on Tuesday evening and the mad race of an uncontrolled elevated train around the curves at 110th street, show the incompetence of new men to perform this accurate and responsible task without a period of instruction. Let the lines be kept open at all cost, but keep the passengers off the trains that have green motormen. One big collision would neutralize the moral victory for the company which otherwise seems assured.

MEETING OF THE SIMPLON TUNNEL HEADINGS.

During the last two or three years many notes recording the progress of the Simplon tunnel have been printed in the *Railroad Gazette*. Announcement is now made that on February 24 the headings of the tunnel met and the Swiss and Italian boring parties came together. The work on this remarkable tunnel, which included within its 12 miles of length about all the kinds of difficulties that tunnel builders are accustomed to meet with and many that they are not accustomed to meet with, may well be regarded as one of the most remarkable engineering achievements of the present generation. It may safely be said that no other tunnel has ever approached the Simplon in the difficulties which it offered to the engineer; yet the work was pushed along with mathematical precision, whether through flint-like gneiss or through soft and disintegrated limestone. It will be recollected that the hot spring encountered by the north heading occasioned the stoppage of work temporarily from that end, last fall. This spring poured out a great stream at a temperature from 151 deg. to 162 deg. (*Railroad Gazette*, Sept. 9, 1904). On September 6 the south heading struck this same hot spring. The south heading, however, was provided with a capacious drainage channel some time ago on account of a river of cold water which had previously delayed the work there for several weeks, and this drainage channel was cut through to the side tunnel, which is hereafter to be excavated for a second track. The hot spring was walled out, and an elaborate cooling apparatus was installed, to make it possible to work in the tunnel at all. About the middle of November the work of isolating this hot spring was completed, and a covered masonry channel a mile and a half long drained the hot water away at the rate of 190 gallons per second, while cold water, driven by centrifugal pumps, was conducted inward by pipes surrounded by non-conducting material, to reduce the temperature, which reached at one time a maximum of 131 deg. Fahr., although the engineers had figured on an extreme maximum of 115 deg. Fahr. This heat is some 25 deg. in excess of any that has ever before been encountered in tunneling.

A table prepared by an engineer connected with the work and printed recently in the London *Times* shows the progress made each year since the inception of the work, as follows:

	Progress, Feet.		
1898.....	1,578	1902.....	11,693
1899.....	11,339	1903.....	11,703
1900.....	11,155	1904.....	5,455
1901.....	11,467	1905.....	564

In spite of the difficulties occasioned by the heat, by the character of the rock, and by the mere fact of the great length of the tunnel, which is approximately three miles longer than the St. Gothard tunnel, 9.3 miles long, and heretofore the longest tunnel in the world, the rock drilling of the Simplon tunnel was carried on at a rate of speed fully twice as great as previous records in hard rock tunneling. A progress rate of 18 ft. of gallery per day of 24 hours was maintained for long stretches together. An interesting and vitally important feature of the efficient organization with which the work was carried on was the care taken of the health of the workmen, who were provided with excellent food at a low price, were brought out in heated cars and taken to a warm station where they changed their clothes and had their clothing carefully dried for them prior to each day's work. Sleeping apartments were also arranged for the men at cost, and while at work they were supplied with 58,000 cu. ft. of air per minute, cooled by spraying and with ice.

The drills with which the remarkable records were achieved were designed by the late Mr. Brandt, of the contracting firm of Brandt, Brandau & Company. They were 3 in. in diameter, rotating slowly, and kept at work by a hydraulic pressure of 1,500 lbs. per square inch, while waste water was discharged along the axis of the tool and in this way the tool was kept cool and the rock cut away was washed out. The estimated cost of the tunnel complete is somewhat less than $20,000,000, and work can presumably now be pushed rapidly on to its completion. Of course, there is still much to be done; but the seemingly insuperable construction difficulties have been overcome.

THE RAILROAD IN CIVICS.

Of late years, and more and more, as the years fly on, we hear of the relation of the railroad corporation to civics—using the latter noun in its largest sense. Usually, also, we hear that relation spoken of in terms of condemnation. The tales of railroad "influence," on municipal councils, on state legislatures and on certainly one of the two houses of the Federal Congress, have become so common as almost to be postulates whenever the railroad, the state and the municipality happen to be the objects of the same discussion. Not much can be written that is new on what may be called the face aspects of the general topic. But the developments of civics on the one hand and of the railroad corporation on the other are bringing to light certain interior facts which deserve attention. Those facts introduce no new and original elements but they do involve changes in degree, in magnitude and in quality which are worthy of comment.

The waxing intensity of the relation of the railroad corporation to public interests is a thing which each year accentuates. To a certain degree this is true of other public service corporations—lighting, water, the telephone and the telegraph—but what may be called their public and civic importance, large as it is, has been so dwarfed by questions of transportation that by contrast it has almost remained stationary. The lighting, the water, the telephone company deals essentially with single commodities; the railroad corporation with many commodities. The conditions of time and space that affect the water supply of a city, however large, or of long distance telephoning look small by contrast, with a transcontinental line of railroad or a consolidation affecting tens of thousands of miles of track and hundreds of millions of dollars. This dominance of the public relation of the railroad is one of content as well as extent, reaching out into a myriad of details involving contacts and collisions of public interest. Many of them are new and each year harvests a fresh crop. We are, for example, hardly beyond the alphabet in the matter of the

rights and wrongs of rate regulation or of the questions raised by electricity as a motive power; and each of these problems and many others bring up new forces in the relation of railroad carrying corporations to public interests.

Now, during the last few decades, while railroad transportation has been so rapidly expanding—and, physically at least, we are bound to say, improving—and while its relation to civics has been growing more acute, what has been the case with those civic bodies which are intermediary between the railroad and the public? For purposes of the argument and of illustration we will not take boards of aldermen or councilmen or, at the other extreme, the Federal Senate, but will consider the middle ground of the state legislatures. It does not rest on the testimony of railroad men but on the written and spoken words of the keenest observers of American civics that our state law makers have for many years gone down hill, in dignity, in intelligence, in *morale*. The most optimistic students of state legislation tell us of upper and lower houses at state capitals filled with professional politicians; of a lobby that began years ago as individuals, passing later through a "group" period and now reaching a stage where it is an "organized" and unified lobby taking its order from a "king"; of "strikes" systematically directed against vested legitimate interests; and of railroad committees—and state railroad commissions—spurred by greed, ambition and the lowest order of partisan politics. The average state legislature, even in Puritan-founded New England commonwealths, has become not merely a body responsive to corporative projects aimed against public interests but a body against which the most beneficent of vested interests must fight, often at great cost, for their own protection.

Now in dealing with such a predatory body, usually unrepresentative ethically of the average citizen, we have not a word to say in defence of the railroad corporation or any other corporation that resorts to illicit means. Right is right, and wrong is wrong eternally, the dictum of fighting Satan with fire is frightfully dangerous and the Ten Commandments do not budge. But if the charge of railroad domination of legislatures holds and the pernicious effect of generous lobby fees is admitted, where rests the fundamental blame? In the nature of human nature is it conceivable that the corporation should rise morally above the parent that created and controls it? Let us idealize a situation: Suppose that in place of legislatures compounded of ignorance, politics and pelf we had state law-enacting bodies in which the majority, at least, incarnated honesty, skill, judgment and equity; that their leaders were practical legislative moralists; and that their railroad committees joined integrity with a fair degree of technical knowledge and training. Were such the existing condition would we be hearing now the criticism levelled so sharply against the malign relation of the great railroad corporation to civics; and, in the long run, would not the good citizen and the railroad corporation alike be satisfied with results?

To summarize the case, through a long period during which the relations of the railroad to civics have been growing in magnitude, attracting special attention by their bigness and becoming more composite and intricate, the legislative *media* between the railroad corporation and the people has been moving downward. An ascending grade of public questions bearing on railroads, contrasts vividly with a descending grade of legislative ability and conscience. The final analysis, however, reaches yet farther back to that condition of civic lethargy in the electorates which has made the decline of representative bodies so swift and easy. The so-called "railroad question," that is to say, is but one branch of the greater query in representative government which is perplexing the best minds of the nation. And in judging it we should be true to the truth. The shaft of criticism aimed at the railroad corporation rather should transfix the communities whose so-called better elements have proved so unresponsive to the case of civic duty. In railroad relations, as in all other products of law making, every community, as an ultimate, reaps as it has sown and gets no more and no less than it deserves.

Northern Securities Share Distribution.

On March 6 the Supreme Court of the United States affirmed the decision of the Circuit Court of Appeals for the Third Circuit in the case of Harriman vs. the Northern Securities Company. The decision was favorable to the Securities Company and allows the assets to be divided on a pro rata basis. That is to say, the Harriman interests, in place of receiving back again the entire amount of Northern Pacific stock with which they went into the company, will be given in return for each 100 shares of Securities stock owned, $2,986.83 of Great Northern, $3,887.73 of Northern Pacific, and a stub for 1 per cent. of the original Northern Securities stock, representing the remaining assets in the treasury pending dissolution. The Union Pacific had no special use for this Great Northern stock, constituting a minority holding, but greatly desired to receive back again the majority holding of Northern Pacific which it had at the outset. Out of a total of $155,000,000 of Northern Pacific stock deposited at the time the Northern Securities Company was organized, it will be recalled that $78,000,000 was deposited by the Harriman-Union Pacific interests, carrying control.

After the Hill plan of distribution was announced, the Harriman interests instituted proceedings in injunction and were sustained by the United States Circuit Court at Trenton last July, which granted the desired injunction to prevent the carrying out of the Hill plan. This decree was afterwards reversed by the Circuit Court of Appeals sitting in Philadelphia, and the Supreme Court verdict of March 6 upholds the Court of Appeals in its refusal to allow the injunction to stand. The question turned in the first instance on the point whether the United States Supreme Court in declaring the Northern Securities Company illegal and in restraint of trade as viewed by the Sherman Act, left the holdings of the respective shareholders as they were before the company was formed, or whether after the component stocks had once been absorbed and held by the Northern Securities Company, they were not to be viewed as combined together as a part of its total assets. It is this latter view which the Supreme Court has now upheld. Chief Justice Fuller delivered the decision without a dissenting opinion. He delivered no written opinion, but said that one would be filed later, which will presumably review the chief points at issue.

Last week the Interstate Commerce Commission gave a supplemental decision in the case brought against the Atchison, Topeka & Santa Fe by California orange growers, holding that the rates charged by the railroad on oranges were unreasonable and unjust, and that the Santa Fe and Southern Pacific are unlawfully engaged in pooling traffic in citrus fruits in southern California. President Ripley has now squarely thrown down the gauntlet on this decision. He says that he will ignore the decision of the commission and rely on the courts for justice; that the commission has ceased to be a judicial body but is now simply attorney for the plaintiff, and consequently that its decisions carry little weight; that they are one-sided and in the nature of a special plea. This instance, not especially remarkable in itself, is full of interesting suggestion at a time when the national legislators are considering the proposal to confer the rate-making power on the commission, and it illustrates well the point which has been so often reiterated in these columns that the prosecuting attorney cannot also expect to be the judge, under the American system of government. David Willcox, President of the Delaware & Hudson Company, discusses this question in the *North American Review* this month, and points out that the substantial usefulness of the commission has been in the way of settling controversies without litigation, and that in that way apparently about 90 per cent. of the complaints filed with it have been adjusted; but the other 10 per cent., constituting the contested cases, in which the orders of the commission have been reversed with substantial uniformity by the court of review, show that proceedings before the commission in a contested case are merely dilatory and serve no useful purpose.

If the commission carries this present case through the courts it will make the forty-fourth suit instituted since 1887 to enforce its orders. It must dishearten that body to reflect that if it does prosecute the case, its chances of winning, based on its previous record, will be as 2 to 44—a 22 to 1 shot.

Delaware, Lackawanna & Western.

Operating results for the year ending Dec. 31, 1904, have to be compared with the earnings during a year when anthracite coal stocks generally throughout the country were depleted as a result of the strike of 1902. It is not surprising, therefore, that the gross earnings, aggregating $28,701,991, should have decreased $478,972 from the 1903 showing. In spite of this decrease in earnings, accompanied by a somewhat greater increase in expenses, chiefly chargeable to the item of maintenance of way and structures, the year was an extremely profitable one; so profitable that the directors, after the payment of the regular 7 per cent. annual dividend, voted an extra dividend of 10 per cent., which was paid December 23. After all expenses and charges and after the payment of both these dividends, there remained a surplus balance of $2,319,871 from the year's operation. Last year there was a current surplus of $4,251,239; although in 1902 the coal strike left a deficit.

The charge for maintenance of way and structures during the current year was $3,916,117, which figures out at about $4,092 a mile; but this includes extraordinary expenditures aggregating $1,715,523, or approximately $1,792 a mile, in addition to the liberal charge of $2,300 per mile for ordi-

nary maintenance. In view of the fact that approximately half the entire system is single track and that none of the lines are laid with more than two tracks, this figure seems very liberal. Maintenance of equipment cost $2,937,675; the average cost of repairs per locomotive amounting to $1,554; per passenger car, $544, and per freight car, $53. The President reports that satisfactory progress has been made during the year on the track elevation in Newark, which eliminates all the grade crossings in that city, and with work of a similar character at Summit, N. J.; and it is expected that both of these large jobs will be completed during 1905. Plans have been made contemplating other extensive work of a similar character, but the company has had difficulty in negotiating contracts on a fair basis with the municipalities through which the suburban lines run. The Lackawanna believes that these municipalities should pay a moderate share of the cost of abolishing the grade crossings, but the city and town authorities seem so reluctant to contribute to the cost of this important work that future work of this character is likely to be postponed until there is greater public demand for it.

The work of completing the new ferry terminal at Twenty-second street, New York, has been somewhat delayed, but will be completed during 1905, and thereafter a ferry service maintained between Twenty-second street and Hoboken.

The installation of new automatic block signals and interlocking plants has been continued throughout the year, about 74 miles of double-track having been equipped and five interlocking plants built and put in operation, the total cost of which ($142,158) was charged entirely to operating expenses. As a result, at the close of the year the company's lines between Hoboken and Elmira were fully protected. It is the purpose of the management to continue this work during the coming year, and by the close of 1906 to have its entire line between Hoboken and Buffalo protected by automatic block signals.

Taking up in detail the income account, the chief change in earnings is shown to be the revenue from the transportation of coal, which is reported separately, and amounted to $13,230,870 last year as against $13,826,844 in 1903. It is interesting, though not surprising, to note that this revenue from handling coal was over 5½ millions greater in 1903 than in the strike year. It is customary for the company to make a large annual appropriation out of income for extraordinary betterments, which might conceivably be charged to the capital account. Last year this appropriation amounted to $4,319,166; this year it was $3,446,719, and included the cost of 30 new locomotives (less balance from locomotives sold and scrapped), 1,450 freight cars and 41 passenger cars. A net change of $411,593 for new bridge work also falls to this account. Earnings from the transportation of miscellaneous freight were practically the same in 1904 and in 1903 and aggregated $8,337,823 in the year under review, a decrease of $17,086. This is attributable to the general traffic situation last winter and spring. The passenger business, however, has continued the notable gains of the past few years and reached a new high record of $5,215,919, an increase of $132,777 over 1903. Since 1898 passenger earnings have shown the rapid increases noted below, with the mileage of the road practically unchanged during the period.

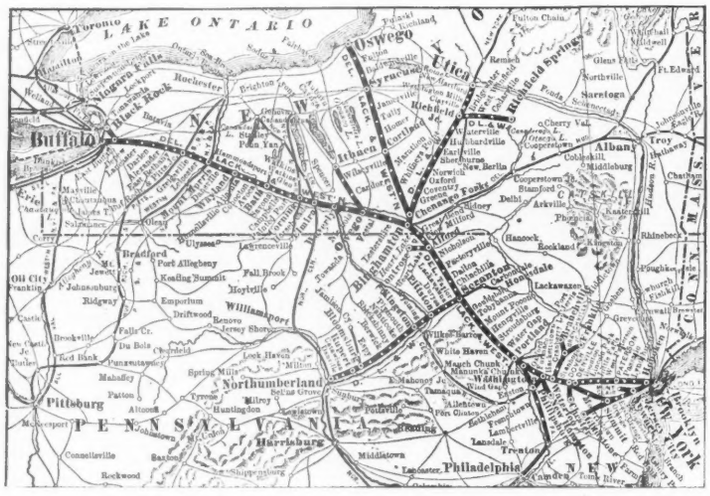
Passenger Earnings

1897.....	$3,408,983	1901.....	$4,522,383
1898.....	3,501,708	1902.....	4,592,036
1899.....	3,951,051	1903.....	5,083,142
1900.....	4,186,232	1904.....	5,215,919

The road has also built up a very profitable milk business, and the earnings from this source, which are likewise reported separately, amounted to $652,526 in 1904.

In the expense account, the cost of conducting transportation, $8,448,362, increased $183,468. The miles run by freight trains decreased 180,331 miles during the year, but miles run by passenger trains increased 152,208 miles. The increased cost of conducting transportation, therefore, with a slightly smaller aggregate train movement and a considerably smaller freight train movement, is attributed to high wages and to high prices paid for fuel and for other supplies and materials. It seems only fair to remark that with a collateral interest in the coal traffic the Lackawanna road has not suffered by this shoving up of the price of coal since the strike. At the worst, the money was only taken out of one wallet and put into another.

The coal department, which reports its operations separately within the covers of the company's report, earned $38,593,998 in 1904 as compared with $36,736,325 in 1903. The figures for both years included coal on hand December 31, which amounts this year to 955,400 tons as against 655,920 tons in 1903, showing that the extraordinary demand is now well satisfied. The profits from the business are set down this year at $3,445,477 as against $3,036,194 last year.



Delaware, Lackawanna & Western.

The following table summarizes the principal results of the year's operation:

Gross earnings.	1904.	1903.
From transp. of coal..	$13,230,870	$13,826,844
Freight, miscellaneous.	8,337,823	8,354,908
Pass., exp. and mail..	6,006,192	5,780,748
Milk	652,526	567,520
Total.....	$28,701,991	$29,180,964
Operating expenses.		
Main. way & structures	$3,916,117	$3,647,959
Main. of equipment....	2,937,675	2,793,086
Conducting transp. ...	8,448,362	8,264,894
Total.....	$15,758,893	$15,170,542
Net earnings, less taxes	$12,049,217	$13,137,560
Renewals & betterments	3,446,719	4,319,166
Total charges...	$9,417,548	$10,553,258
Net income*	$6,773,871	$6,085,239
Dividends	4,454,000	1,834,000
Surplus, balance ...	$2,319,871	$4,251,239

*Including coal department earnings.

NEW PUBLICATIONS.

The Field Practice of Railway Location. By Willard Beahan, B.C.E., Division Engineer, Chicago & North Western Railway. New York: Engineering News Publishing Company, 1904. Octavo, cloth, viii + 252 pages, 6 plates. $3.

This volume aims to place on record the methods of railroad location commonly used west of the Mississippi river. It begins with a brief discussion of the general conditions which govern the feasibility and character of the proposed road as limited by the amount and class of traffic, the topography, the capital available, and the method of financing a new line. This is followed by a description of the methods used in making the reconnaissance, running the preliminary and location, and the organization, subsistence, equipment, and pay of the field parties.

Reconnaissance is discussed in detail and illustrated by several sketches and three plates, especial stress being laid upon the advantage of making a thorough reconnaissance rather than leaving part of the information to be obtained when the preliminary is run. A description of the report made by the engineer when the reconnaissance is completed is also given. The organization, subsistence and equipment of field parties is treated in detail. The duties of each man and the instruments needed are described fully, and sketches are given of the safest way to pitch camp, especially in a country infested with hostile Indians. Eight pages are devoted to itemizing the necessary food and medical supplies, and a table is given comparing the supplies allowed by five railroad systems, the Mississippi River Commission, and the U. S. Army. Of course, the necessity for this camp equipment becomes less as the great systems are completed and long stretches of line through unsettled country become fewer. The comparison of this part of the book with present conditions will be very instructive to field engineers who have not had the experience of camping on the line.

The author divides the country through which the line runs into three classes: (1) Where no preliminary is needed; (2) where one preliminary is needed; and (3) where several preliminaries must be run over at least a part of the route. Four pages are then given to a general description of the method of making the reconnaissance, and completing the preliminary over a certain stretch of line before the camp is moved. Then follow the field methods of running the line in detail. A sample page of topography notes is given, and many engineers will differ decidedly with the author about the necessary topography. No contours are taken, which may be good practice in open country, but contours would surely be neces-

sary in a broken country, particularly if heavily wooded. In objecting to too much adjustment of instruments the author has gone to the extreme of saying, "Adjusting pins belong in camp. They should be carried on the line for emergencies only, and carried by the assistant." Thirty pages are given to the equalizing of gradients for the different types of locomotives and train resistances. The subject is handled in such a manner as to prove that the locating engineer must understand these facts in order to assume proper rates of grade, but not in sufficient detail for him to do so without referring to special works on the subject. The topics of grade and curve resistance, rise and fall, and virtual profile are also handled in a way that will be understood by the experienced engineer, but not with sufficient clearness for the student or novice.

The method recommended for the final location of the road is that the locating engineer shall select the guiding points by walking over the best preliminary line, with map and profile of the same in his hand. This method, although advantageous for long lines in a new and open country, which are to be built at the lowest possible cost, is now largely replaced, at least in the eastern states, by that of office location. Most of the problems formerly solved by the locating engineer in the field are now finally decided by the chief engineer in his office, or, at least, sufficient data must be sent to the chief engineer by the field party to convince him that the best line has been obtained. The radical difference between the two plans of work makes the book all the more interesting, as it records the history of the methods used when the locating engineer in the field had practically the final decision. Many field engineers will disagree with the statement that the witness stakes should always be set on the right of the line, for the left side gives certain advantages in reading the marks. The book seems to contain but few errors; the computed course on page 240 is wrong; and on page 246, Plate A and Plate B, profile papers are reversed. The author's style is not elegant, but it is often vigorous, and many of his statements are presented with great emphasis. The book will be interesting reading to locating engineers, and valuable and suggestive to all young men employed in railroad field work.

Structural Designers' Handbook. By William Fry Scott. New York: The Engineering News Publishing Co., 1904. Octavo, pages viii + 158.

This volume contains 34 tables and 51 diagrams for designing beams, columns, and girders, the data for the same being the market sizes of shapes and beams and the requirements of the building code of New York city. The tables of the properties of steel angles, beams, and channels are very complete, as they include those produced by all important mills in the United States. There are also two pages giving properties of beams rolled in Germany, Belgium, and England, those for the two continental countries being expressed in inches and thus appearing with many decimals; the simpler equivalents in centimeters should have also been given, as they would be needed by a designer in ordering material.

The numerous diagrams given by the author will be of much value to designers of steel buildings who thoroughly understand the theory of the subject. Similar diagrams are in use in many offices, but publication of them to the extent here done has not previously been made. As printed, many of them are too small for convenient use and should be redrawn on a larger scale in order to conserve the eyesight of the user. The explanation of some of these diagrams might have been made much clearer; for instance, at the foot of page 52 the quantity "0.2 lbs." should be simply 0.2, as it is an abstract number; again, on page 81, the quantity "2.6" should be 2.6 in. The word "ton" is frequently used, but the number of pounds in a ton does not appear to be stated.

The author introduces some new terms, one of which is excellent. The "ratio of slenderness" is the ratio of the length of a column to the least radius of gyration of its cross-section. "Section-moment" is that quantity which is equated to the bending moment in discussing a beam; this new term cannot be commended, since the one in common use is resisting moment, which expresses the idea so well that no change is advisable. On the whole, the work appears to have been done with much painstaking care and in accordance with sound theory. The tables and diagrams are of limited application, since the unit-stresses used throughout are those specified for buildings by the New York code, and hence many of them cannot be used for bridge work. The hope of the author, that the book may prove useful to the expert designer, will certainly be realized, but to the non-expert and student it can scarcely prove to be more than suggestive, since diagrams of this kind can only lead to sure conclusions in the hands of those who understand the theory from which they have been prepared.

TRADE CATALOGUES.

Metallic Packing and Chime Whistles.—The Northern Metallic Packing Co., St. Paul, Minn., is distributing an artistic 16-page pamphlet devoted to "Northern" metallic packing and the Curran chime whistle, of which it is the sole maker. Half-tone engravings show sectional views of the different styles of packing with vibrating cups, and the claims to merit are stated. There is also a "brief talk" on metallic packing. The Curran chime whistle and "Northern" whistle valve are also illustrated and described.

Ideal Power.—The name of the little trade magazine, "Something Pneumatic," which was begun last year in the interest of the Chicago Pneumatic Tool Company, has been changed to "Ideal Power" as being more appropriate, as both electrical and pneumatic subjects are to be treated in future. A change in policy also is announced as a result of the large demand for the magazine, and an annual subscription price of 10 cents has been placed upon it. The present circulation is about 8,000 copies. Articles upon either compressed air or electricity are solicited. The office of the magazine is 1005 Fisher Building, Chicago.

Car Heating.—Special circular No. 3 of the Chicago Car Heating Co., shows No. 112 horizontal steam trap, No. 104 end train pipe valve, No. 510 safety valve for hot water circulation, and No. 500 filling device for hot water circulation. The circular is 8½ x 11 and describes these devices in detail, illustrating them with good clear engravings from line drawings.

Locomotive Headlights.—The Dressel Railway Lamp Works, New York, sends an illustrated catalogue of its standard designs of headlights for locomotives and electric motor cars. Details of the burners used on the oil lights are given, and electric lights shown are designed to use the Pyle National electric apparatus.

Asbestos Gaskets.—The H. W. Johns-Manville Co., New York, is distributing a small pamphlet bearing the title "Flange Joint Gaskets." The advantages of asbestos for this purpose are fully described, and a complete list of the sizes and prices of the "Kearsarge" flange joint gasket is given.

Industrial Railways.—The C. W. Hunt Co., New York, sends an illustrated descriptive catalogue of its industrial railways and of its standard and special designs of cars for use on the same. The catalogue also includes narrow gage electric locomotives, track weighing scales, etc.

Disastrous Collision at Emsworth, Pa.

Seven persons were killed and 33 more or less seriously injured in a rear collision of eastbound passenger trains near Pittsburg, on the Nortwest system of the Pennsylvania, on Friday evening, March 3, about seven o'clock. Both of the two trains were occupied by military and political parties from Cleveland bound for the inauguration ceremonies at Washington. The first train consisted of a baggage car and six Pullmans; the second of a baggage car and four tourist sleepers. The two trains were running from Rochester to Pittsburg as second and third sections, respectively, of Fort Wayne train No. 6. They left Cleveland about two o'clock, and the first train had to stop several times on account of a hot-box on the baggage car. A stop for this reason was made about half way between Clifton and Emsworth stations (7½ miles west of Pittsburg), a very short distance east of a block signal. The train was stopped for a time variously estimated by crew and passengers at from one to six minutes, when the following train crashed into its rear, ploughing through the whole length of the rear car and part way into the next one. Fire broke out almost immediately, supposedly from a ruptured gas-tank in the demolished rear Pullman. Some of the bodies were burned, but all of the fatalities were caused by the collision, not by the fire.

As usual there is conflicting testimony from the passengers concerning the behavior of the flagman, some saying that he had not time to go back before the following train was upon him, and others that he might have started promptly but did not. At last accounts the flagman was not to be found. An officer of the road said that he was in Ohio. As to the block signals, there seems to be no question that these were in good order and giving the right indications. On this part of the line the signals are automatic, three-position, fixed on bridges spanning the four tracks. One of the reporters had a story that the engineman may have taken the signal which gave indication for the other eastbound track; but there seems to be no basis for this conjecture except that an error of this kind is said to have been the cause of a collision on a curve near this place a few years ago. In the present case it is said that the third section had been following the second section so closely that it had been finding the distant signals adverse for several block sections.

The rear end of the standing train at the time of the collision was only a few yards ahead of a signal; so near to it that a part of the wreck fell against the support of the signal bridge.

An officer of the road on Tuesday issued a statement to the effect that the signal at Dixmont, 3,744 feet west of the standing train, showed caution; and that the signal immediately in the rear of the train showed red; and that the engineman stated that because of the drifting smoke he did not see the Dixmont signal and proceeded at full speed until within 1,000 feet of the standing train, when he saw the rear lights. The engineman was dismissed.

The Union Pacific Gasolene Motor Car.

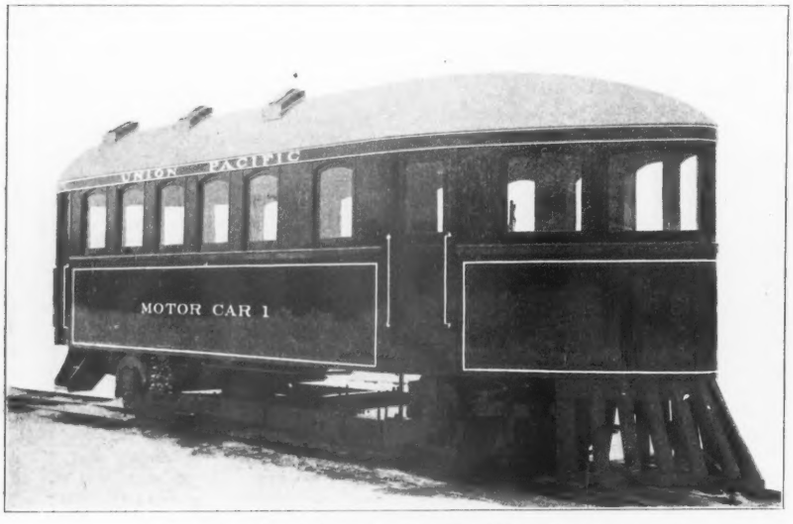
For some time past the Union Pacific has been engaged in developing a gasolene motor car suitable for high-speed branch line and interurban service. The car was turned out of the shops a few days ago and is now being given service trials. The design of the car presents some new features, being modeled after the lines of the racing yacht Reliance, inverted. The rear of the car is rounded off to avoid the formation of the vacuum present with square-ended cars. The front tapers to a sharp point. The roof is given a taper from the middle to produce a splitting effect in the atmosphere and minimize resistance. It is entirely smooth except for the Cottier ventilators, which exhaust by suction the air from the interior of the car.

The truck is of original and unique design with many new features. It is intended to embody the good points of the street car, Pullman and locomotive trucks. The most important feature is the design of the springs. They are so constructed and applied as to avoid the teetering action ordinarily experienced in the old-style trolley car. The truck wheels are 42 in.

The car is driven by a six-cylinder gasolene engine made by the Standard Motor Works, Jersey City, N. J. It is a remarkable machine and is quite similar to the design used in the Standard auto-boats which made such a wonderful record in the auto-boat races on the Hudson River last June. The Standard boat No. 1 was capable of a speed of 25 to 30 m.p.h. The engine was redesigned and built in accordance with the railroad company's plans to make it suitable for motor car service. Large air reservoirs are carried underneath the car, and by means of the air passage and a starting device the car is rapidly put in motion and picked up by the engine, attaining a maximum speed, without jar, in a minimum space of time. The designers claim that there is practically no limit to the speed that the car may attain, though it will probably be limited to a service speed of 40 m.p.h. The clutches and controlling devices are all mechanical and of simple design. Special effort was made to avoid the complicated machinery usually found in gasolene-engine propelled motor boats and cars.

The ventilation of the car is said to be particularly good, the air being almost as fresh as that outside. The air is taken in at the top of the car and by small ducts is gradually diffused throughout the interior. In the winter time the air is passed over hot pipes before entering the car. The impure air is sucked out at the top through the ventilators. Another feature of note in the design is the provision for thoroughly cleaning and disinfecting its interior. The floor is made water-tight so that the car can be flushed out with hot water to kill all germs and sources of infection. The seats are leather and the walls and ceiling are made as smooth as possible to enable thorough cleaning with little labor.

A system of coils through which the water from the cylinder jackets may be circulated, runs around inside of the car for warming it in winter, sufficient heat being radiated to produce a comfortable temperature. Another system of coils is provided under the car for use in summer time. The heating of the car is regulated by a controlling valve which passes more or less water through each system of coils as the temperature requirements of the interior make necessary. By means of an air cylinder the rear door is kept closed while the car is in motion. When it is desired to let passengers on or off, the door is opened and the step trap-door lifted by air cylinders operated from the front end. Thus, passengers cannot alight from or board the car while it is in motion. The car is considered to be an unusually strong design, impossible to telescope or crush, affording safety to its passengers in case of collision or wreck.



New Gasolene Motor Car for the Union Pacific.

The lighting is by acetylene, including the headlight. The interior lighting is through opalescent panels, giving a good strong light over the shoulder for reading, while the general lighting is pleasing and restful to the eye. The car is painted maroon with aluminum trimmings. Its seating capacity is 25. This particular car is intended for local passenger service out of Portland, Ore. It was designed and built at the Omaha shops of the Union Pacific under the supervision of Mr. W. R. McKeen, Jr., Superintendent of Motive Power and Machinery.

Standard-Code Rules.

Should not there be a Revision of those for Single Track?

BY H. W. FORMAN.
Author of "Rights of Trains on Single Track."

(*Continued from page* 183.)

After considering all that has been published concerning rules 4 A and 4 B, and all other arguments that I have heard from time to time, I can offer nothing better than the following, which may be called composite rules, since they are what appear to me to be the best points made by those who have attempted to improve them.

"4 (A). Each time-table, from the moment it takes effect, supersedes the preceding time-table.

"All schedules of the preceding time-table are thereupon annuled, and trains authorized by them can thereafter proceed only by train order.

"No schedule of the new time-table shall be in effect on any district until its leaving time at its initial station, on that district, after the new time-table takes effect."

"4 (B). Each time-table, from the moment it takes effect, supersedes the preceding time-table. A train having a schedule corresponding in number, direction, initial and terminal stations on both the preceding and the new time-table shall retain its train orders and transfer to the schedule of the same number after the new time-table takes effect. When a train leaves its initial station before the new time-table takes effect and can, by rule, complete its trip on the schedule of the same number from some intermediate point on that district after the new time-table takes effect, such part of that schedule as it is known to have fulfilled by the preceding time-table shall be regarded as having been fulfilled on the new time-table.

"A schedule of the new time-table which does not correspond in number, direction, initial and terminal stations with a schedule on the preceding time-table shall not be in effect on any district until its leaving time at its initial station, on that district, after the new time-table takes effect."

"*Note of Explanation.*—Under rule 4 B, it shall be understood that when, say No. 1, leaves its initial station at 11:30 p.m. by old time-table, and a new time-table takes effect at 12:01 a.m., scheduling No. 1 to leave the same initial station at, say 12:30 a.m., another No. 1 cannot leave such initial station at 12:30 a.m. by the new time-table, because the No. 1 on the road will assume that schedule to complete its trip. Should No. 1 be late and not start by old time-table, it will, after the new time-table takes effect, transfer to the schedule of the same number at its initial station.

"In cases where, say, No. 1, is due to leave its initial station at 11 p.m., and a new time-table takes effect at 10 p.m., scheduling them out of such initial station at 9 p.m., it can start on its trip the moment the new time-table takes effect, being then one hour late on its new time-table schedule."

Should it be decided to adopt the second of these forms, the "Note of Explanation" underneath should be printed with and be made a part of the same, for the guidance of men who may still be in doubt.

About the first query that will be propounded will be how men can always *know* that the train of the preceding time-table will assume the same numbered schedule on the new time-table, and so make it clear to other trains that such schedule will not be again used from the initial station. I should answer this by saying that in nearly every case it will be made clear to inferior trains by their having met such train by old time-table. If it is not met, the schedule time on the new time-table must be cleared. In extremely doubtful cases, the train despatcher may be questioned, or a train order may be issued to clear up an uncertainty, the same as at present. I do not believe the proposed rule to be invincible, but it appears to me to be somewhat better than the present one. I will heartily support any other which may prove to be simpler or which will more fully cover the field.

There has been some adverse criticism of the expression "Unless otherwise indicated," in the second paragraph of Rule 5. It could be changed to read: "The time applies to the switch where an inferior train enters the siding; where there is no siding it applies to the place from which fixed signals are operated; when there is neither siding nor fixed signal, it applies to the place where traffic is received or discharged."

Also, there appears to have been an omission of the word "met" in the fifth para-

graph of Rule 5; it should read "When a train takes a siding extending between two adjoining telegraph stations, to be met or passed by one or more trains, the time at each end of the siding will be shown in full-faced type." It often happens that trains meet at such stations between the times given at the ends of the siding.

Referring to Rule 6: The leaving time of a train should never be shown by lower-case letter "l," as it closely resembles a figure "1" and might cause a time-table to be read 11:30 p.m., instead of 1:30 p.m. Nearly all roads spell the word out in full, or indicate leaving and arriving time by "Lv" and "Ar."

Some roads have Rule 6 (A), reading:

> "6 (A). Notice of new time-table must be bulletined at least 24 hours prior to its taking effect; for six days thereafter superintendents must, by train order, require each conductor and engineman to acknowledge receipt of new time-table.
>
> "Before starting on any district upon which they have not been running, or when absent for six days or over, conductors and enginemen must inquire for and know that they have the current time-table and supplement."

SIGNAL RULES.

It is hardly thought to be necessary to discuss the many objectionable features connected with using white lights to indicate safety, or "proceed." Rule 10 allows a colored light to be selected for this purpose if it is desired to do so, and different companies have adopted different colors. Green appears to be giving entire satisfaction as a proceed indication. Yellow is being used by some companies for caution, and a combination of green and red by others. It is not likely the Train Rule Committee would care to prescribe green for "proceed" and allow some other color to be selected by each individual company to indicate "caution." But unless this committee arbitrarily prescribes colors for the three movements—stop, caution and proceed—it is doubtful if there will ever be uniformity.

Many late books of rules show Rule 11 as below:

> "11. A fusee on or near the track, burning red, must not be passed until burned out. When burning green, it is a caution signal. Fusees must not be placed on wooden structures, or elsewhere where fire may be communicated by them."

It is now common practice to also illustrate the hand, flag and lamp signals in Rule 12, instead of printing these diagrams in the back of the book. This economizes space and is much better in every way. The 12 *e* signal is difficult to give without confusing it with a signal to stop. In the lately issued book of the Rock Island System, this is required to be given by swinging the lantern horizontally at arm's length above the head. It would be difficult to give the 12 *f* signal without burning the wrist. Men generally grasp their lanterns by the base and hold them high above their heads.

Rule 14, example *k*, should read "To call the attention of trains of the same or inferior class, or inferior right, to signals displayed for a following section." There are at least two good reasons why this should be done: As worded at present, one may infer that the attention of extra trains need not be called to such signals, since extra trains are not classified. Also, when an inferior class train is given right over, or an order to meet a superior class train, and sections are not specified, as may be done under Rule 218, the superior class train then becomes the train of inferior "right" and its attention must be called to the signals displayed by the sections of the inferior class train.

The following paragraph should be added to Rule 14. "Should a train fail to answer the 14*k* signal, the train displaying such signals must stop at once and personally notify it; and must report such failures." I am aware that this cannot be enforced on double track; but we are not discussing double-track rules. Some time since a member of the committee stated that this whistle signal was merely an auxiliary safeguard and might be omitted entirely without risk, as trains must know by observation that all sections of a superior train have arrived. I disagree. It is only necessary to recall some of the causes which made possible certain recent collisions to understand why. The crew on the waiting or inferior train may be asleep, or may fail to carefully examine engines to ascertain whether or not signals are displayed to protect a following section. I know of an instance within the past six months where two passenger trains met between stations on account of failure of the superior train to stop and personally notify the inferior train when it was noted that its signal was not acknowledged. This occurred in broad daylight and after the operator had taken the precaution to advise the inferior train that there were two sections of No. 400.

> "Rule 15. The explosion of one torpedo is a signal to stop; the explosion of two, not more than two rail lengths apart, is a signal to reduce speed, and look out for a stop signal. Torpedoes must not be placed near stations or road crossings where persons are liable to be injured by them."

The above is the rule generally adopted in preference to that of the code. Telegraph poles and rail lengths may be inelegant terms by which to designate distance, but they are very acceptable when one considers the class of men who must read and understand the rules.

A great many books still prescribe that torpedoes shall be placed on the engineman's side. Enginemen assert that it is not possible to determine in every case on which rail the explosion takes place, and to allow an engineman to suppose that the signal is not given to stop or caution his train, is decidedly unsafe. If the engineman should disregard the signal when placed on the wrong rail by an illiterate foreigner who may have been engaged in an emergency to patrol the track, an accident might easily result from such an ill-advised rule.

> "Rule 18. Yard engines will display the head-light to the front and rear by night. When not provided with a head-light at the rear, two white lights must be displayed."

A number of officials take exception to the word "head-light," and use "reflecting light" instead in the above rule. I can see nothing wrong with the code rule in this respect. A head-light is a well-known device for lighting the way, and it still remains a head-light whether it be placed on the front or rear of an engine, or is used to light up a tennis court. But I do not think the last sentence of the present Rule 18 should be allowed to stand, as it only provokes argument. When one begins speaking of a yard engine in connection with markers there is at least an inference that it may sometimes be regarded as a train, and that when an extra is given right over all trains, yard engines should have notice of such extras. A yard engine is simply a machine used to shift cars within yard limits and need not be advised of approaching trains. The rule fully prescribes how they shall be equipped to work in yards; and to go on and say they will not display markers is entirely unnecessary, and is sometimes misleading.

The Train Rule Committee of the Train Despatchers' Association contend that Rule 20 should read as follows:

> "20. All sections of a schedule except the last will display two green flags, and, in addition, two green lights by night, in the places provided for that purpose on the front of the engine."

The plausible and effective part of their argument lies in the fact that an extra is a train and Rule 20 should be so worded that it may be understood to refer only to regular trains.

> "22. When two or more engines are coupled to the head end of the train, the leading engine only shall display the signals as prescribed by Rules 20 and 21. Only the leading engine should be referred to in train orders."

The present rule is criticised because the engines may be pushing the train, in which case the rear engine would display the classification or identification signals. The diagrams explain how signals shall be arranged when the engines are at the rear. It required a decision of the committee some time since to satisfy some companies that train orders need be addressed only to the leading engine.

There appears to be no good reason why Rules 24 and 102 cannot be consolidated, if worded as follows:

> "24. When cars are pushed by an engine, except when shifting or making up trains in yards, a flagman must take a conspicuous position on the front of the leading car and signal the engineman in case of need. By night, a white light must also be displayed on the leading car."

The idea throughout should be to group all similar rules. This rule would not suffer any if pruned of the words "or making up trains" as "shifting in yards" fully covers that.

> "27. A signal imperfectly displayed, or the absence of a signal where one is usually shown, must be regarded as a stop signal, and the fact reported to ———."

The word "signal" is used oftener than is necessary in the present rule.

The present code Rule 29 reads:

> "29. When a signal (except a fixed signal) is given to stop a train, it must be acknowledged as prescribed by Rule 14 (g)."

I have often wondered why Rule 29, in its present form, was ever put in the code. Example (g), in Rule 14, fully covers the point. It may be insisted that 14 (g) does not positively say that stop signals shall be answered. Neither does 14 (k) arbitrarily direct that this signal shall be utilized. The rule simply explains its meaning. The natural inference is that all these signals must be used and acknowledged when proper to do so. The rule, as at present worded, creates the inference that a cautionary signal, and possibly some others, need not be acknowledged. If it is desired to prescribe that fixed signals indicating stop, caution or proceed shall not be answered, but when given by other means such signals shall be, it would be well to change the wording of the rule accordingly. I do not think fixed signals should be answered, and recommend changing Rule 29 to read:

> "29. When stop, caution or proceed is indicated by a fixed signal, it shall not be acknowledged as prescribed by Rule 14 (g).
>
> "When a caution signal is given to a train by other means than a fixed signal, it must be acknowledged by ———."

No one will say that enginemen should not acknowledge a caution signal, and that the answer should not be made in some other way than by two short blasts of the steam engine whistle.

It would be well to change Rule 31 to read:

> "31. The engine-bell must be rung on approaching stations and public road crossings at grade, and until they are passed; and the whistle must be sounded at all whistling posts."

It would seem to be as necessary to require by rule that the bell shall be rung on approaching stations and while passing the platform as it is to instruct that it be rung for road crossings. However, I do not mean that the bell shall be kept ringing while the engine is standing at the station.

CLASSIFICATION OF TRAINS.

Extra trains should not be regarded as of any class whatever, since only time-table

trains may enjoy that distinction. It is, therefore, necessary to make their superiority, as between each other, and in their other relation to the meaning of the rules clear, by additional rules, or by changing the present ones. Rule 81 should provide for their superiority as to direction by adding a third paragraph reading "At meeting points, extra trains, as between each other, are superior in the direction in which regular trains are made superior by time-table."

Rule 82 is not entirely clear; a great many are under the impression that "train order" means that when a train has lost right and class by reason of its failing to arrive less than 12 hours late at a station where it has an arriving and leaving time, it may "flag in" and then be given an order to resume its schedule, if not 12 hours late on its leaving time when ready to continue its trip. When a train becomes 12 hours late I think it should be told that it loses right and schedule, rather than right and class. In order to make the rule clearer on these points, the following is offered as a substitute:

"82. A regular train 12 hours behind its time-table schedule time loses both right and schedule, and can thereafter proceed only by train order to run extra, or to run on another existing schedule."

It may be asked why I make use of the expression "behind its time-table schedule." I regard this as better, as some roads use a "late schedule" form of order for regular trains, which I endorse and shall propose such a form in the proper place in this paper.

MOVEMENT OF TRAINS.

Rule 84 reads:

"84. A train leaving its initial station on each division, or leaving a junction, when a train of the same class in the same direction is overdue, will proceed on its schedule, and the overdue train will run as prescribed by Rule 91."

And Rule 93 reads:

"93. A regular train which is delayed, and falls back on the time of another train of the same class, will proceed on its own schedule."

It may be assumed that in cases where both trains are standing at the initial station, or a junction, the train which is scheduled to depart first will do so. Rules 84 and 93 also mean that trains once started must not change their relative positions on the road, except by train order, or when one becomes disabled. One regular train must not pass another of the same class which is not disabled, though it may have work to do that will delay the following train unnecessarily; nor may one extra train pass another extra train, without the formality of a train order. It is sometimes held that the following train of the same class may pass at a station where the train in advance has an arriving and leaving time, provided the movement can be made without encroaching upon the leaving time of the train ahead. Once it gets by, the train which has been passed must remain behind, until it can in the same manner go by the train which passed it. It is also sometimes ruled that when the train ahead has only a leaving time shown and drifts into a station in advance of its leaving time, the following train of the same, or inferior class, may pass it, if it can do so and clear such train's leaving time. Under such decisions, and after considering the provisions of Rules 94 and 221 (A), and the further fact that a great many roads which adopt the Standard Code recognize the impracticability of such rules and immediately insert a special rule in their time-table nullifying Rule 93, the whole proposition seems quite farcical; both from a standpoint of safety and from that of practicability.

The following is offered in lieu of Rules 84 and 93:

"84. When a train of one schedule falls back on the time of a train of another schedule of the same class, it may proceed on its own schedule.

"Trains of one schedule may pass trains of another schedule of the same class, and extras may pass extras."

Rule 91 makes it clear how following trains shall proceed for the time being.

A great many companies have changed Rule 85 to read:

"85. A train must not start until the proper signal is given.

"A freight train must not pass any station or siding without its engineman receiving a 'proceed' signal from the rear end."

As this is the universal practice, it should be recognized as a good thing, and be provided for by code rule.

"86. An inferior train must keep out of the way of an opposing superior train, clearing its time as required by rule.

"An inferior train must keep out of the way of a superior train in the same direction, clearing its time at least five minutes."

The second paragraph in the above rule, somewhat differently worded, is taken from Rule 89, as here seems to be the logical place for it, whatever wording may be decided upon.

"88. At meeting points between trains of the same class the inferior train must clear the main track before the leaving time of the superior train, and must pull into siding at the initial switch when practicable. If necessary to back in, or to pass the initial switch to pull into siding, the train must first be protected, as prescribed by Rule 99, unless otherwise provided."

The present rule does not fully cover every condition; trains sometimes pass the initial switch to pull into a siding at a cross-over. Of course such movements should be protected, but the rule does not say in just so many words that the train must first be protected in such cases.

"89. At meeting points between trains of different classes, the inferior train must clear the main track at least five minutes before the leaving time of the superior train, and must pull into siding at the initial switch when practicable. If necessary to back in, or to pass the initial switch to pull into siding, the train must first be protected, as prescribed by Rule 99, unless otherwise provided."

It will be noticed in the present rules, 88 and 89, the wording is different. There does not appear to be any reason why they cannot be worded alike.

So far as it governs trains moving in the same direction, Rule 90 is one which I have never fully understood. When one train is scheduled to pass another there can be no doubt but what the train which is to be passed must, if practicable, take the siding at the scheduled passing place, and wait there indefinitely for the train which is to pass it; and any rule that may allow the presumption that this shall not be done must be understood to be superseded for the time being. Accepting this as the true meaning of the second paragraph of this rule, it is not quite clear why it should prescribe that the train which is to pass, and which may be regarded as superior to the train which it is to pass, shall, when the train is not found at the passing point, approach all stations prepared to stop, until it is passed. I can think of but two ways that the train which is to be passed can proceed beyond such passing point: by a train order to run ahead of the following train, or by an order stating that the train which is to pass it will run a certain number of hours or minutes late. If it is given an order to run ahead of the train which it is scheduled to allow to pass, it has the same right that an extra train running ahead of such train would have, and it is not understood that when a regular train receives an order that an extra train is running ahead of it that it shall approach all stations prepared to stop. It is the duty of the extra train to protect itself when it stops or is delayed so that any following train may overtake it. If the train which is to be advanced beyond the passing point, ahead of the train which is scheduled to pass it, is given an order that the train which should pass will run, say, one hour late, such time must be cleared five minutes, because the train thus moved ahead is the inferior train from the passing point, until it is passed by the train of the same class which is scheduled to pass it.

"92. A train must not arrive at a station in advance of its schedule arriving time, except as provided in Rules 88 and 89.

"A first class train must not arrive at a station, where only its leaving time is shown, more than five minutes in advance of its schedule leaving time.

"A train must not leave a station in advance of its schedule leaving time."

I notice that the above rule is used even by some of the roads which have members on the Train Rule Committee. This would seem to indicate that there was a difference of opinion concerning it. I like it. There is no reason why a first class train should arrive at a station where it has only a leaving time shown, more than five minutes ahead of time. It may catch an inferior train on the main track, or, while waiting for time, may be overtaken. The code rule is also impracticable because it says that when a train has an arriving time at a station it must not arrive in advance of such time. Should a second class train be scheduled to meet a first class train on its arriving time at such point, it will be seen that, although the second class train may be right on time, it cannot legally go to its meeting point, since it cannot arrive five minutes ahead of its arriving time and it must clear the first class train at least that many minutes. The rule should provide for this by making the exception above shown.

Not being classified trains, extras cannot find authority in the present Rule 94 to pass a disabled train. In my opinion, this rule should be made to read as follows:

"94. A train so disabled that it cannot proceed may be passed by any following train. If necessary, the train passing will exchange train orders and identity or schedule with the disabled train, proceed to the next open telegraph office, and there report to the ———. The disabled train will take the train orders and assume the identity or schedule of the last train with which it has exchanged, and will, when able, proceed to and report from the next open telegraph office."

It is not enough to say that a train shall take only train orders and schedule, as extras do not have schedules.

"95. An extra train must not be run without train order authority.

"A train must not display signals for a following section without train order authority, except that at certain stations designated in the time-table operators or ——— may, over the initials of the ——— ——— authorize trains to run in sections. Such instructions shall be written in manifold on white paper and must be signed by the conductor, who will deliver a copy to each of his enginemen."

It is gratifying to note that many companies are now allowing operators or yardmasters to issue signal instructions for despatchers, thus relieving them of a routine duty which may be safely delegated to others. No one can offer a single valid objection to the practice, while much can be said in its favor. I shall not take up space to point out its advantages, as they must be apparent. I have moved trains under such an arrangement for years, know it to be absolutely safe and practicable, and endorse it unqualifiedly. It is customary to issue such instructions over the initials of the chief train despatcher, or the train master. They are not train orders and do not constitute a clearance.

"96. When signals displayed for a section are taken down at any point before that section arrives, the conductor will, if

there is no other provision, arrange in writing with the operator, or if there is no operator, with the switch tender, or in the absence of both, with a flagman left there for the purpose, to notify all opposing trains leaving such point that the section for which the signals had been displayed has not arrived.

"An operator thus arranged with, must, at once, display his order signal at stop and allow no opposing train to pass without the required notice.

"When practicable, despatchers shall advise opposing trains before they reach the station where signals were taken down."

This I regard as the best of the rules lately put into effect relating to this matter. The words "in writing" are necessary. I notice that every one has failed to provide for extra trains being notified. Also, when we say "of the same or inferior class" we leave a technical loop hole in case an inferior class train should be directed to meet a superior class train and the signals be taken down on the inferior class train at the meeting point. It must be kept in mind that Rule 218 does not require sections to be specified and that it is not done on all roads. The rule is very seldom used, but that is no reason why it should not be made invulnerable.

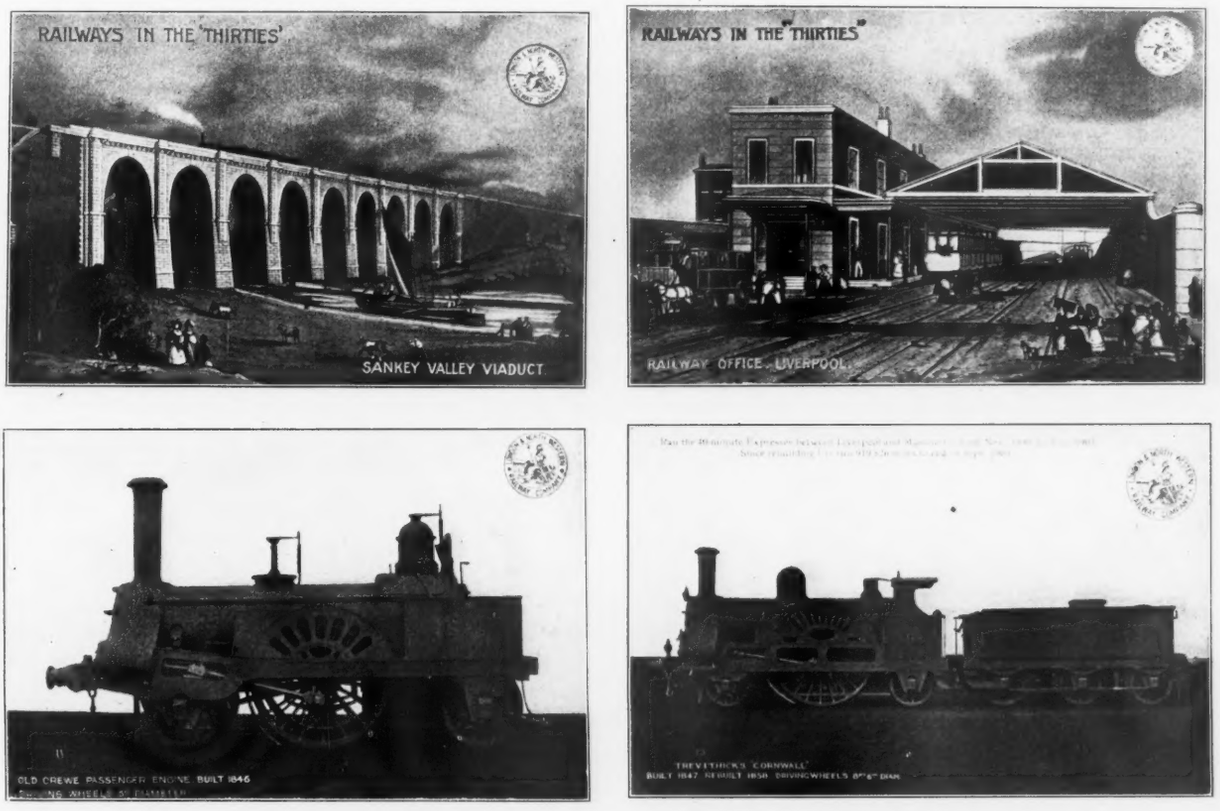
(To be continued.)

L. & N. W. History Cards.

In the art of issuing advertisements of your business in such seductive shape that the reader will be glad to pay for the privilege of reading them, "America's greatest railroad" now has a rival; and it is England's "Greatest," the London & North Western. The L. & N. W. sells six picture post cards for two pence, or four cents (though in America the price is 10 cents); and they are really attractive pictures. They are printed by a new "carbontype" process and the subjects are mostly connected with the railroad itself, only 12 being devoted to scenery and 12 to steamships, out of the 168 —and the steamships belong to the railroad company. Indeed, the selection might be said to have been made for railroad men and students of railroads; but as the latter class, by a liberal interpretation of the term, now includes millions of men and boys, not to mention girls, the selection may prove as profitable as any that could have been made. The packets of cards are numbered from one to 14, already issued, and 15 to 28 to be published later. Packet No. 1 is entitled "Railways in the Thirties," and contains the familiar picture of George Stephenson, a train crossing Chat Moss, etc. No. 2 shows old locomotives; Trevithick's engine of 1803; the first compound built for the North Western, etc. No. 3 shows bridges; No. 5, royal trains; No. 7, places of interest (Shakespeare's house, Kenilworth Castle, etc.); No. 9, modern locomotives; No. 13, carriages; No. 16, tunnels, and so on.

In locomotive practice the cards give a skeleton history of that feature of this railroad, but, seeing that the earlier examples of engines built for the North Western embodied designs so varied and interesting that a description of them in chronological order would form a fair history of the British locomotive, a few more examples of engines built in the thirties and forties might have been presented in place of so many of the modern types, which, as far as outward appearance goes, are all pretty much alike. In packet No. 12 we have Ramsbottom's engine "Lady of the Lake," and in another a view of pick-up water troughs, invented by Ramsbottom. The Ramsbottom engines, however, were little more than a larger edition of those designed by Alexander Allan. Allan was the inventor of the straight link motion, and his engines, built at Crewe in the forties and early fifties, were second to none in careful design and capacity for speed. We reproduce a card showing one of Allan's engines, built in 1846. It is apparently in its original form, except the smoke stack. The driving wheels are 6 ft. diameter. Another card shows one of Bury's engines built in 1835 for the Liverpool & Manchester. It is described as "the first engine with inside cylinders." This is doubtless a slip of the pen, as Bury's "Dreadnought," Stephenson's "Planet," and Hackworth's "Globe," all built in 1830, had inside cylinders. One of the most striking subjects is the "Cornwall" with its 102-in. drivers and its record of *fifty-eight years* of service. This we reproduce. In the 47 years since it was rebuilt this engine has run 919,526 miles. American engines built in 1847 —or even in 1858—have not only passed long since to the happy hunting grounds of their kind, but have been joined there by all of their children and most of their grandchildren. The other two cards which we produce are samples from Packet No. 1.

The first of these cards was issued five months ago, and the number sold has amounted to a million and a half already. The American agent of the road is A. G. Wand, 852 Broadway, New York.


RAILWAYS IN THE THIRTIES
SANKEY VALLEY VIADUCT
RAILWAYS IN THE THIRTIES
RAILWAY OFFICE - LIVERPOOL
OLD CREWE PASSENGER ENGINE BUILT 1846

London & North Western Advertising Post-Cards (Reduced about one-third).

Locomotive Testing Plant of the Pennsylvania at St. Louis.

Bulletin No. 2, issued by the Pennsylvania Railroad Company, which was published in the *Railroad Gazette* May 13, 1904, gave a general description of the locomotive testing plant at St. Louis. We are now able to give a more detailed description of the plant.

As is well known, the purpose of the locomotive testing plant is to permit the performance of a locomotive to be determined with the same accuracy as that of a stationary engine. In fact, the locomotive is converted into a stationary power plant, the drivers being mounted on supporting wheels whose axles are extended to receive absorption brakes. The turning of the supporting wheels, and hence of the locomotive drivers, is resisted by the brakes, the amount of resistance being controlled by water pressure. All the work done by the cylinders of a loco-

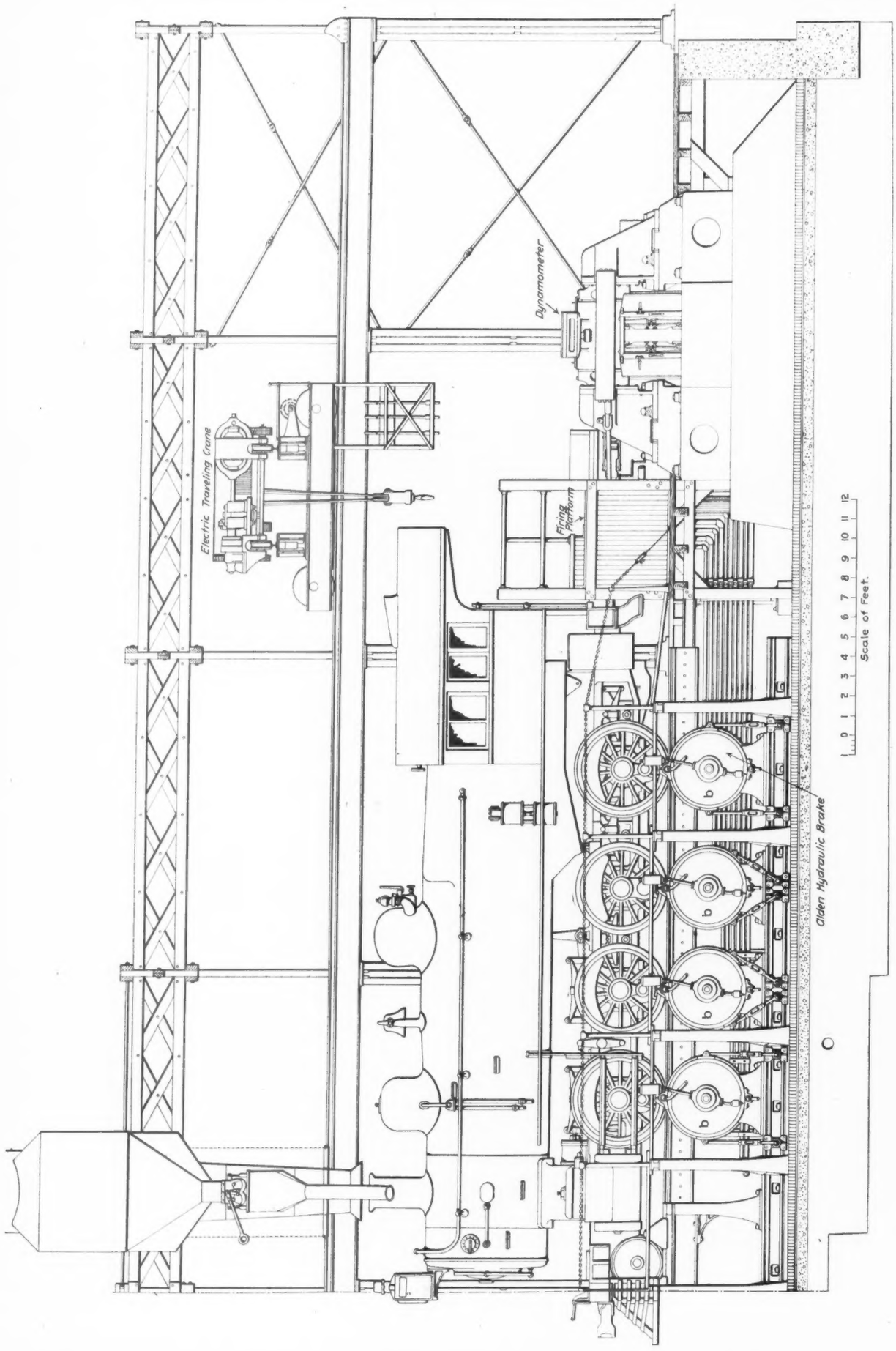


Fig. 1—General Elevation of Locomotive Testing Plant.

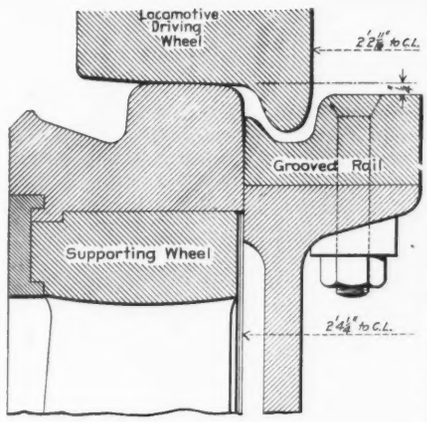


Fig. 3—Method of Mounting Locomotive Drivers.

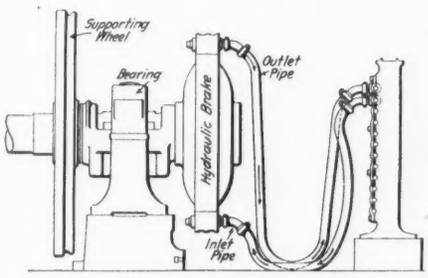


Fig. 5—Supporting Wheel and Brake.

motive is absorbed by the friction of the locomotive parts and by the brakes, the resulting force at the drawbar being measured by a traction dynamometer. A general side elevation of the locomotive testing plant is shown in Fig. 1, and an end elevation is shown in Fig. 2.

The base of the plant consists of two longitudinal bed plates of cast-iron resting on a heavy concrete foundation. The bed plates have T slots in them so that the pedestals of the supporting wheels can be adjusted to the wheel spacing or number of drivers of the locomotive. There are two sets of supporting wheels. One set of five pairs has 50-in. wheels and the other set of three pairs has 72-in. wheels. The small wheels are used under freight engines and the large set is used under passenger locomotives having large driving wheels. There are also two sets of pedestals corresponding to the two different diameters of supporting wheels. The journal boxes are of special design, cored out and arranged for cooling by water circulation. On the ends of each supporting shaft are the absorption brakes (b).

A locomotive is placed on the plant in the following manner. The supporting wheels are first placed in position corresponding to the spacing of the locomotive driving wheels. I-beams, which rest on the supporting shafts and extend the entire length of the pit, are then bolted to the inside of the supporting wheels on each side of the plant. On the upper flange of the I-beams is riveted a grooved rail (see Fig. 3) placed so that the flanges of the drivers will run in these grooves. The locomotive is moved to its position on the plant by being run on the flanges of its drivers, leaving the treads free to come into position upon the supporting wheels. When the locomotive is properly placed, the special rail and I-beam can be removed. The truck wheels rest on rails which are bolted to 15-in. I-beams, as shown in Fig. 4. The truck wheels are prevented from moving longitudinally by wedges bolted to the rail.

With an engine thus mounted and running in forward direction, it will be seen that

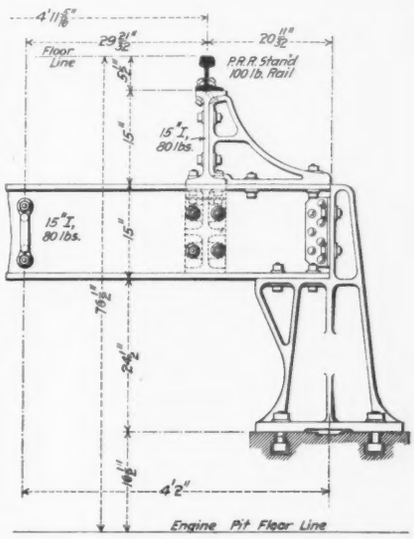


Fig. 4—Support for Track Wheels.

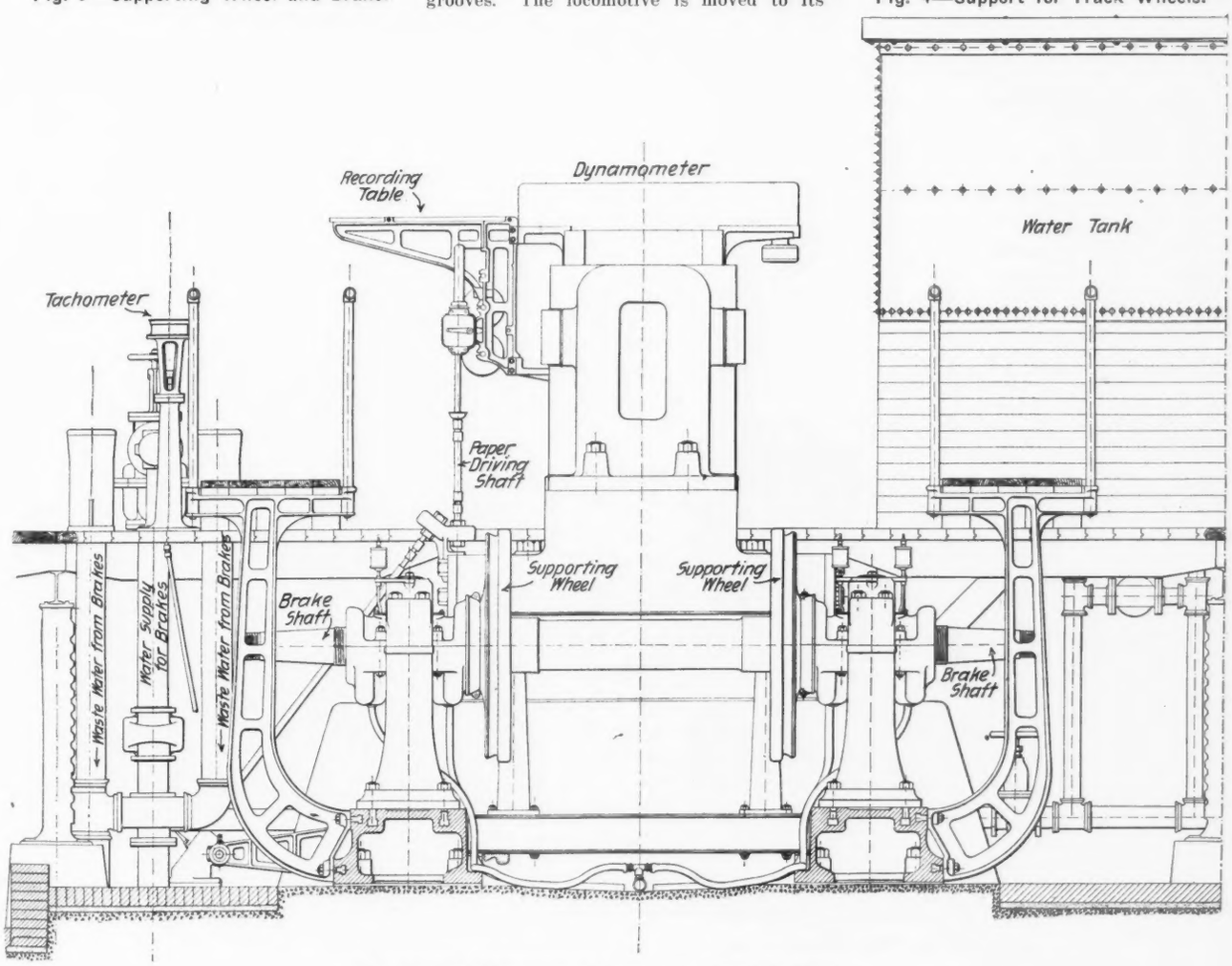


Fig. 2—End Elevation of Locomotive Testing Plant.

the supporting wheels will be forced to move backward. If the turning of the supporting wheels is then resisted by the brakes, the locomotive will tend to move forward. But forward movement is prevented by the drawbar which connects to the dynamometer. The resistance to turning is thus made to appear as a stress on the drawbar, the magnitude of the stress being measured by the dynamometer. These same results hold true if the locomotive is run backwards except that the drawbar is put in compression instead of tension. The dynamometer registers either tension or compression.

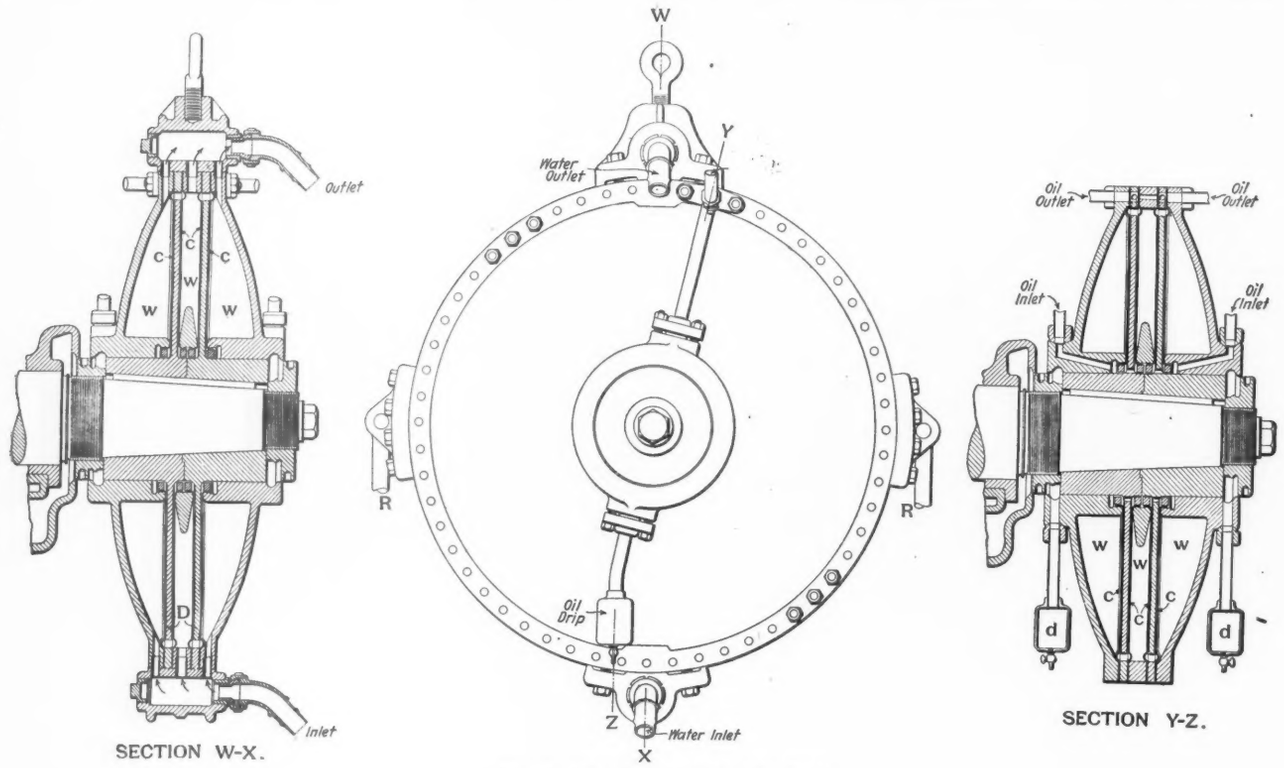
A general view of one supporting axle with wheels and brakes, together with the water connections, is shown in Fig. 5. The details of the brakes are shown in Fig. 6.

periphery of the revolving discs by centrifugal force and flows out through the oil outlet pipes at the top and back into the cans. A continuous circulation of oil is thus maintained. Part of the oil which leaks around the revolving hub is caught in the oil drips (d). The method of driving the tachometer is shown in Fig. 2.

The smoke and gases from the locomotive are carried out of the building by a telescopic stack (see Fig. 1) which can also be adjusted longitudinally. Inside this stack is a cone deflector which diverts the sparks into the spark trap where they are caught and weighed.

The traction dynamometer which measures the drawbar pull of the locomotive is of the lever type, having Emery flexible steel plates which take the place of knife edges. The dynamometer was built by Wm. Sellers & Company. In order that the locomotive be held in position on the supporting wheels it was necessary to limit the allowable longitudinal movement of the drawbar to the smallest amount possible. The weighing apparatus is also capable of measuring either tensional or compressional stresses. The drawbar height is also adjustable. The drawbar pull is recorded graphically. The Emery system of fulcrum plates was choosen so as to eliminate forces due to friction, as these plates are subjected to simple bending and compression without the rolling action which takes place with knife edges as used in ordinary scales.

The general arrangement of the dyna-



SECTION W-X. SECTION Y-Z.

Fig. 6—The Alden Hydraulic Brake.

This type of brake was first used by Prof. G. I. Alden, formerly of Worcester Polytechnic Institute. The outside case of the brake is held from revolving by the rods (R) which are bolted to the T slots in the bed plate. The discs (D) revolve with the hub which is keyed to the taper fit on the supporting axle which transmits the power to be absorbed. These discs are provided with radial grooves. Stationary copper plates (c c c c) are on each side of the discs (D) and a circulation of oil is maintained between the copper plates and the revolving discs. Water under pressure circulates through the spaces (w w w), the effect being to press the copper plates towards the revolving discs and introduce the desired resistance to turning. The copper plates and the discs are protected from wear by the oil, the resistance being due to the viscosity of the lubricant. The circulating water enters at the bottom of the brake and comes out at the top, the pressure being regulated by valves controlling both the inlet and outlet independently. The heat generated is carried away by the water. The right-hand section of Fig. 6 shows the oil holes. Oil enters on each side from cans connected to the inlet pipes. The oil flows downward towards the hub and is carried towards the

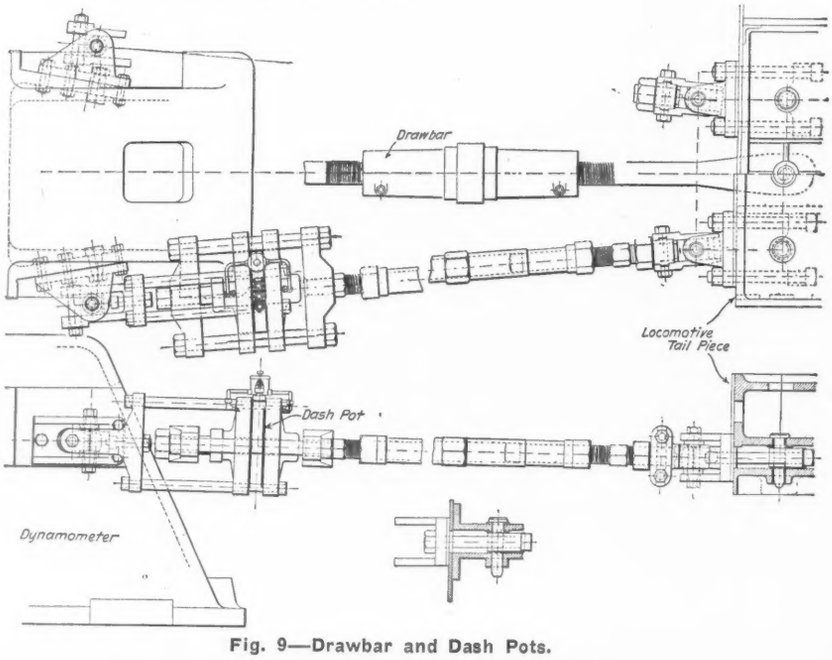


Fig. 9—Drawbar and Dash Pots.

mometer is shown in Figs. 7 and 8. The castings (A A) together with the forged connecting pieces (B B) form a frame or bed plate upon which the abutments or housings (C C) are supported. These housings are further held together by the tie bars (D D). These parts form the fixed or rigid framework of the machine and are anchored to the masonry foundation by bolts. The lugs or dowels (p) prevent sliding on the foundation.

The drawbar of the dynamometer is shown in Fig. 9. The dash pots which connect the locomotive tail piece and the dynamometer housing were added in order to absorb the backward and forward motion of the locomotive which took place at high speeds. The drawbar can be raised or lowered through a range of 12 in. in order to connect horizontally with the drawbars of different locomotives. There are two elevating screws. The weight of the drawbar is carried by two flexible steel plates and it is held in alinement by flexible rods so that its movement may take place without friction. A ball and socket joint permits slight vertical or horizontal movements of the locomotive without putting bending stress on any part of the drawbar.

The dynamometer weighing levers are shown in Fig. 10 and also in Fig. 11. The lever system is in duplicate. The levers have at the fulcrum

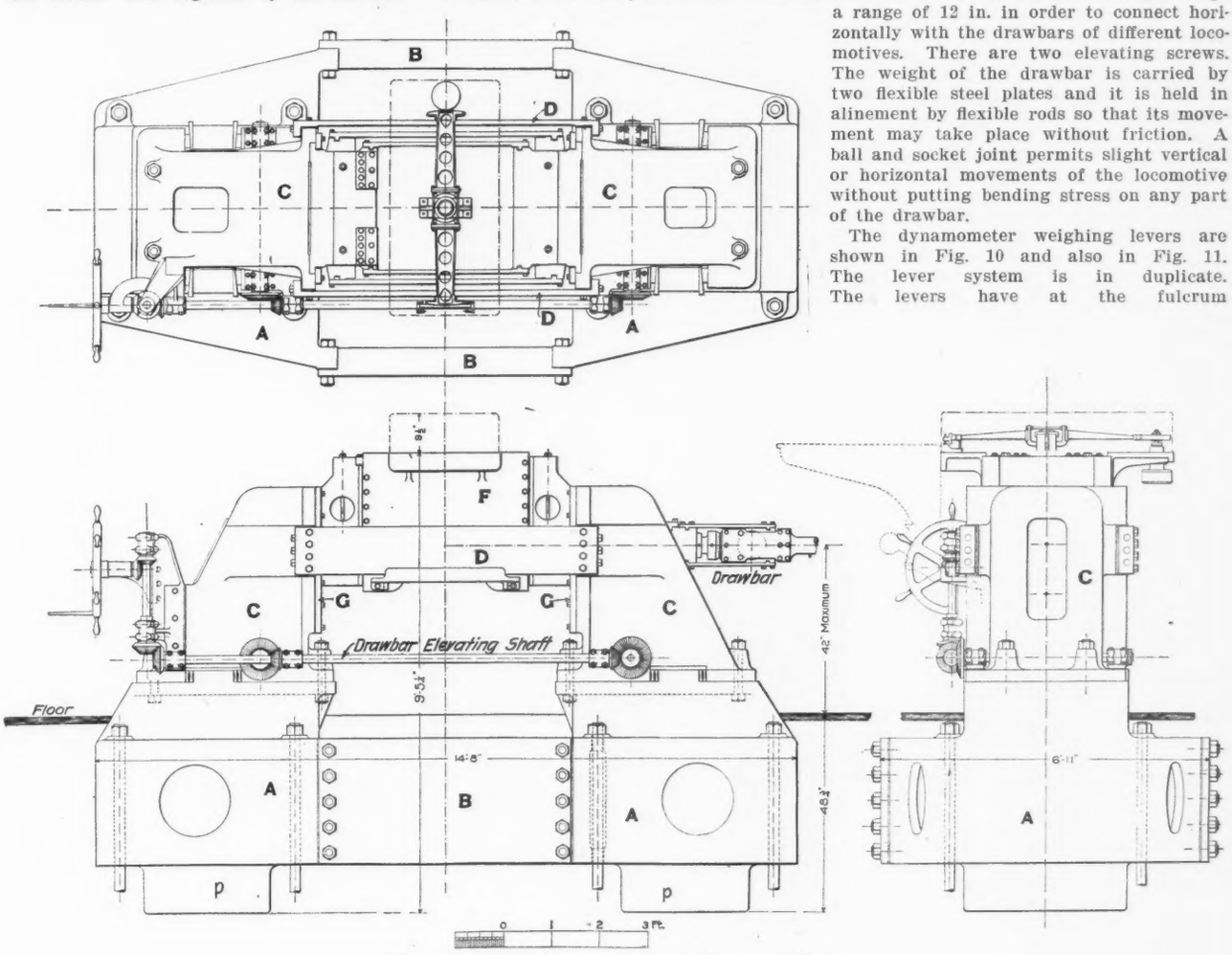


Fig. 7—General Arrangement of Dynamometer.

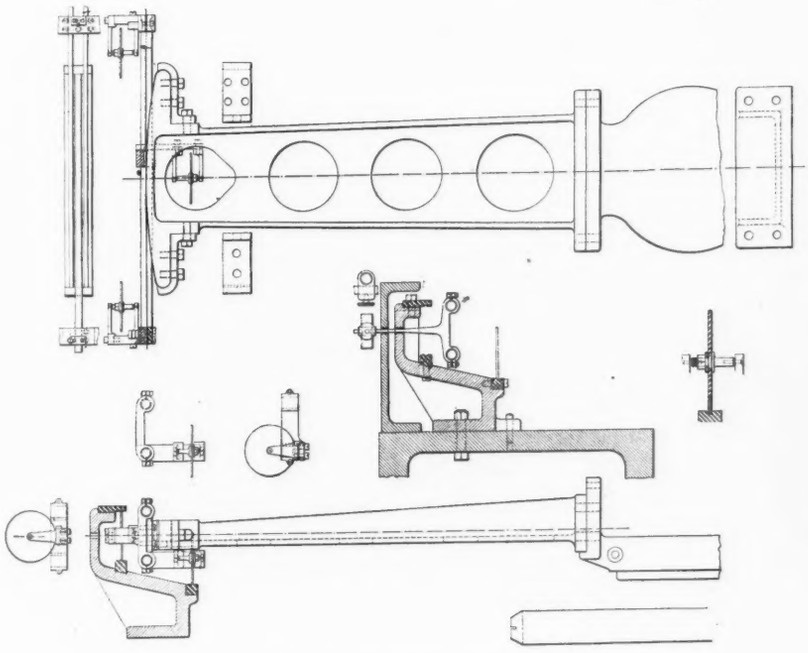


Fig. 13—Recording Pen Arm.

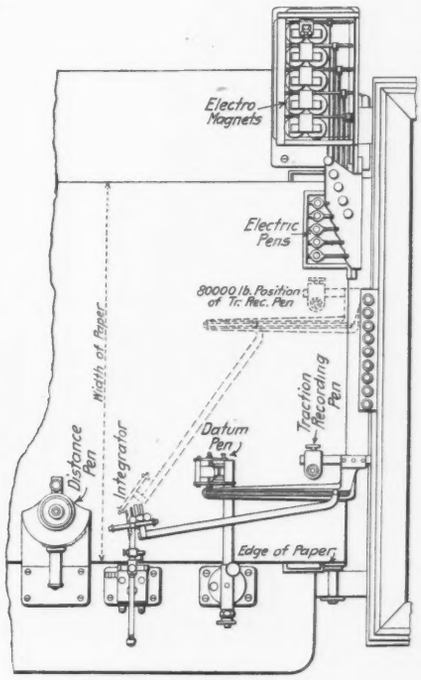


Fig. 15—Recording Table.

points flexible steel plates (Emery system) as shown in detail in Fig. 12. Initial stresses are prevented by supporting the levers both horizontally and vertically as at (N) and (M) in Fig. 12. With the locomotive running forward, the drawbar pull is imposed upon the left-hand block (E) which tends to move towards the right. This force is transmitted through the flexible plate to the lever (1) which is fulcrumed at (f_1). Lever (1) in turn transmits the force through the block (R) to the lever (2), which is fulcrumed at (f_2). The movement of lever (2) is resisted by the spring (V). The lower ends of both levers (2) drive the belt drum (J), which is connected to levers (2) by means of arms (O) and thin steel bands (N) so that the movement of the levers rotates the drum. The movement of the belt drum is transmitted upward to the pen arm (P), which rotates on the same shaft. The drum (J) is attached to a heavy tube (H), which is in turn fastened to the pen arm. The movement of the pen arm, however, is resisted by the torsion rod (I) which passes through the tube (H). The rod (I) is fastened rigidly at (L). It will be seen that whether tensional or compressional stresses are measured, both systems of levers are brought into play and similar levers of the two sets move in the same relative direction. The plate (R) transmits the forces from one set of levers to the other.

The end of the pen arm (Fig. 13), to which the recording pen is attached, swings in an arc, but this movement is rectified by a small carriage rolling in a straight runway and attached to the pen arm by thin steel bands. At the other end of the pen arm is a rotary dash pot to damp the vibrations of the dynamometer. This dash pot is shown in detail in Fig. 14. The vanes (Vm) are attached to the shaft (s) and turn in the case (K). The fixed vanes (Vf) are attached to the case which is filled with oil. When the holes (h) are open the oil may pass freely from one side to the other of the moving vanes without offering much resistance to turning. The resistance may be increased, however, by turning the nut (n) at the top which forces down the plug (p) until the holes (h) are partially covered. All rotating parts of the dynamometer have ball bearings.

The total motion of the drawbar due to the movements of the lever systems, when under full load does not exceed .01 in., so that a locomotive exerting a drawbar pull equal to the full capacity of the dynamometer will not move forward on the supporting wheels more than .01 in. This motion is increased 200 times at the recording pen so that for every .01 of an inch which the locomotive moves forward, the recording pen moves through a space of two inches.

The recording table is shown in Fig. 15. The roll of paper having been wound on a spool or drum is inserted in bearings at the bottom of the table frame. The paper is then carried over idler rolls and across the surface of the table. It then passes between gripping rolls and then to receiving roll or spool which is driven by the speed mechan-

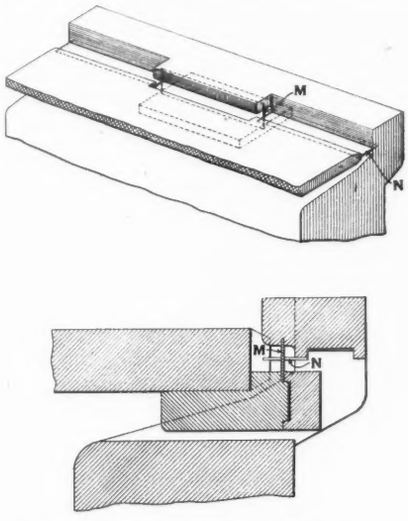


Fig. 12—Emery Fulcrum Plates.

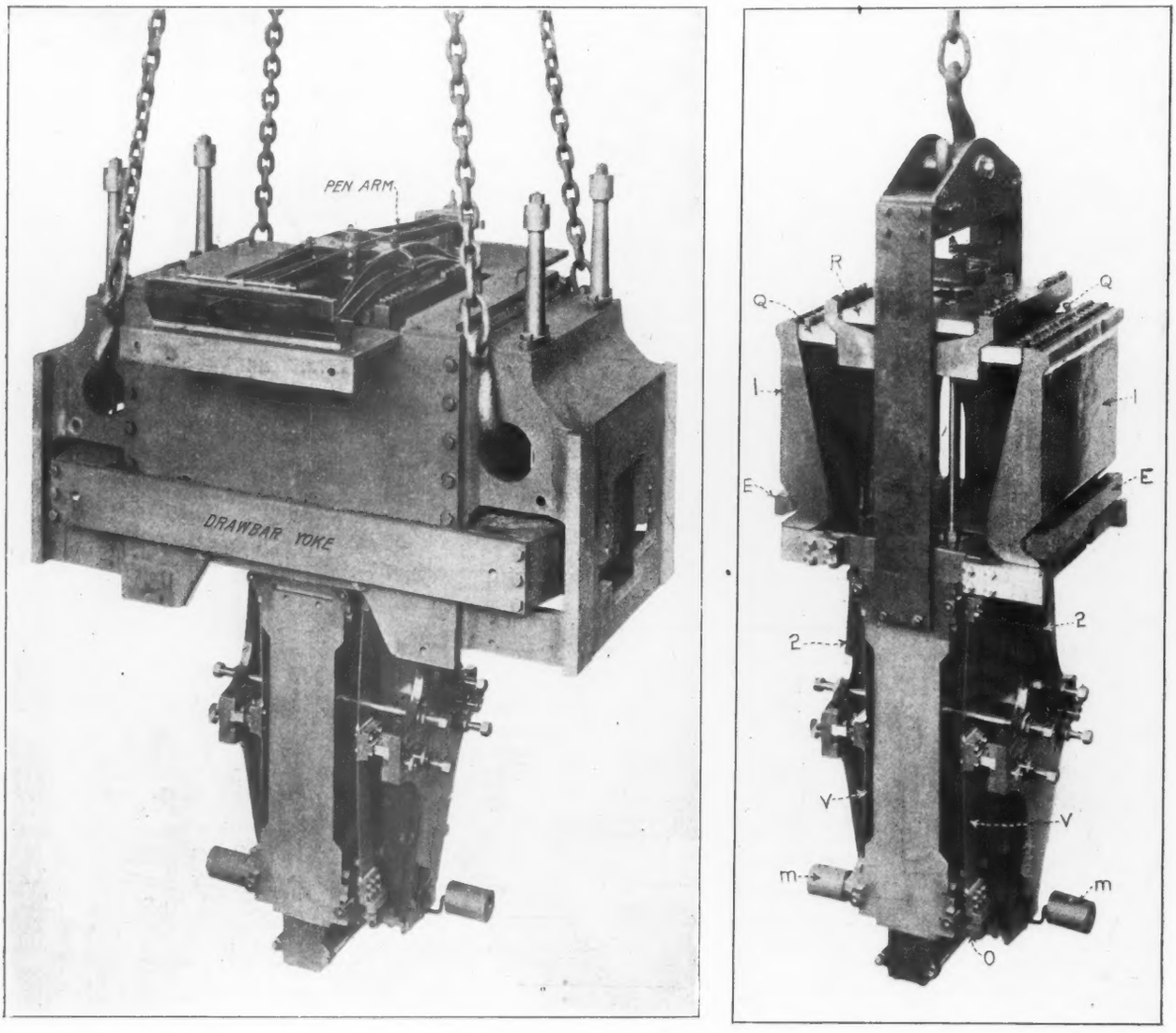


Fig. 10—Dynamometer Weighing Levers.

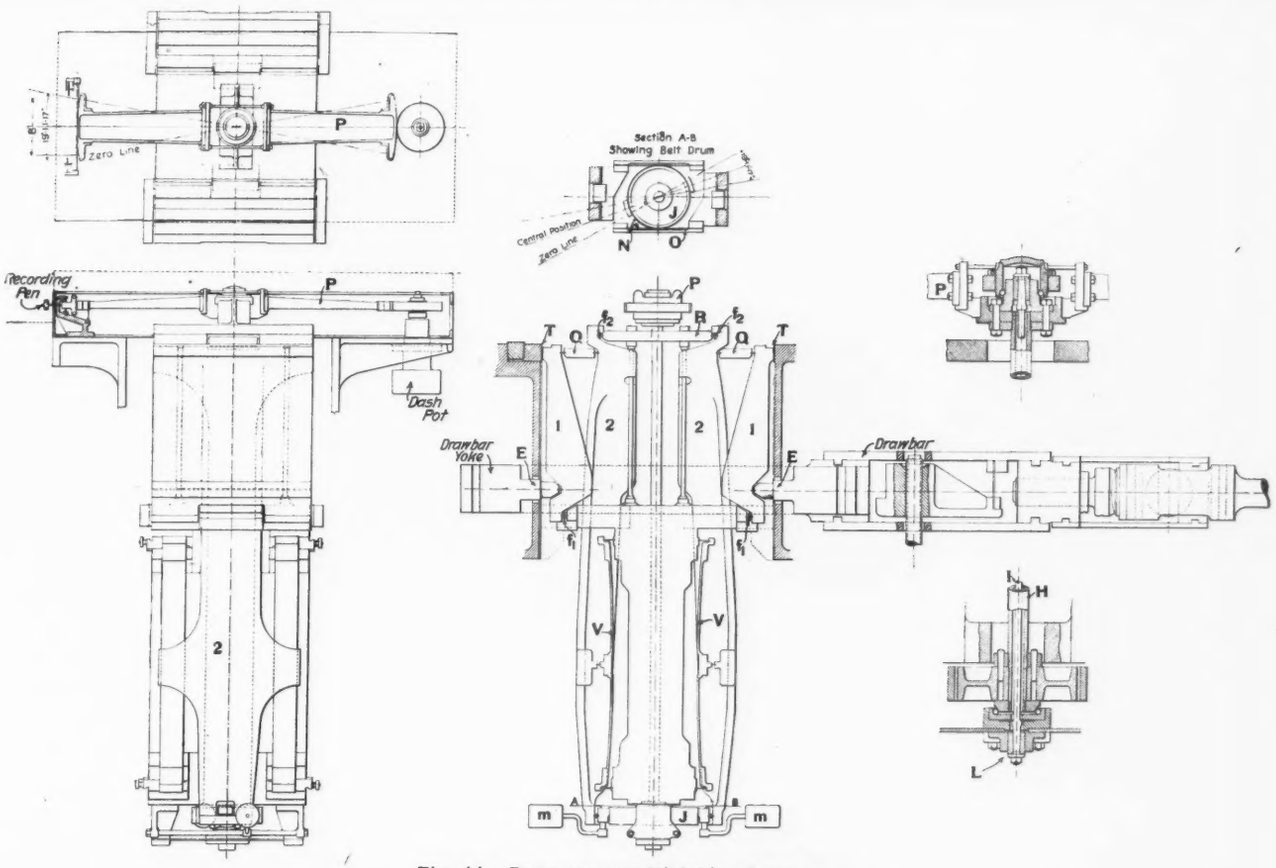


Fig. 11—Dynamometer Weighing Levers.

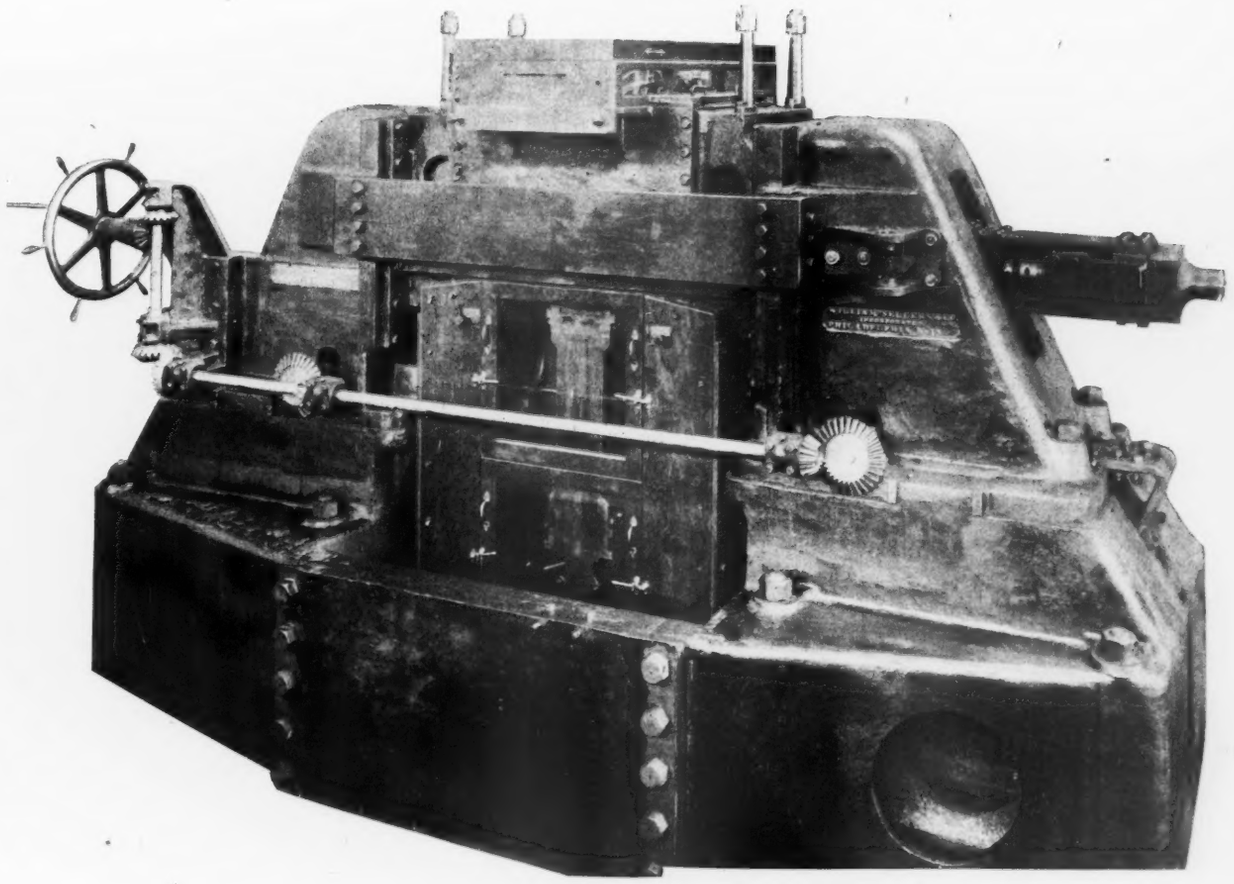


Fig. 8—Dynamometer and Housing.

ism. A reversing mechanism is provided so that the paper may be stopped or its direction of motion changed. The speed of the paper is thus directly proportional to the speed of the supporting wheels. The gear ratio is such that for each 1,000 ft. of travel of the supporting wheels the paper moves forward 10 inches. For very slow speeds,

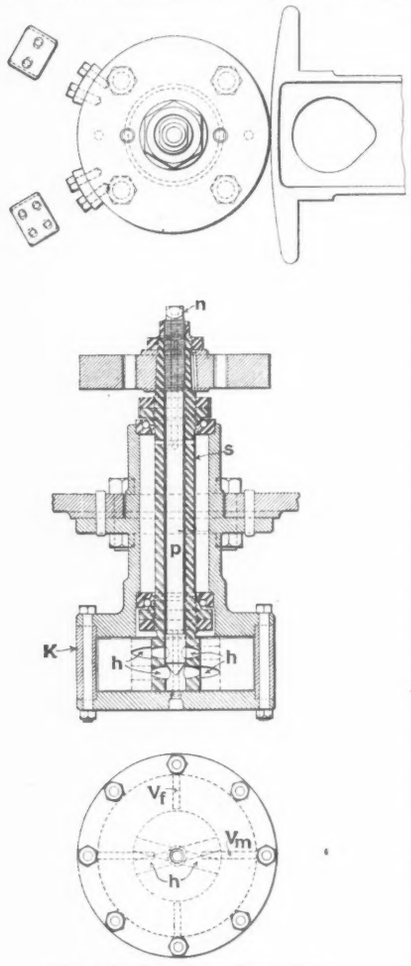


Fig. 14—Pen Arm Dash Pot.

however, the paper motion can be geared up to 20 in. per 1,000 ft.

In addition to the drawbar pull the dynamometer makes a record of the datum line, the integrator line, the seconds line and the distance line. A typical section of a record is shown in Fig. 16. The bottom line is the

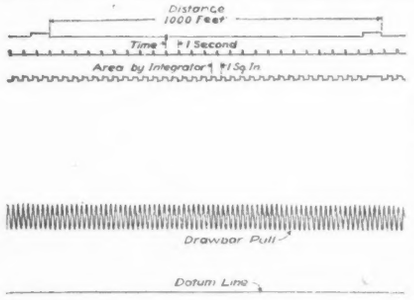


Fig. 16—Typical Dynamometer Record.

zero or datum line. The second line is the drawbar pull line—the vertical distance from the datum line being proportional to the pull. The third line gives the area under the drawbar pull line, each mark indicating one square inch. The fourth line marks off seconds. The top line shows the distance traveled by the supporting wheels in 1,000 ft.

The dynamometer is designed to measure up to 80,000 lbs. By changing the springs (V V), shown in Fig. 11, the capacity may be changed to 40,000 lbs. or to 16,000 lbs. In other words, with the 80,000-lb. springs, the scale of the dynamometer record is 10,000 lbs. per sq. in. as measured from the datum line. With 40,000-lb. springs the scale is 5,000 lbs. per inch, and with 16,000-lb. springs the scale is 2,000 lbs. per sq. in.

London Electric Railways.

On January 25th the Hon. R. P. Porter lectured in London before the Society of Arts on "London Electric Railways." He discussed the varying considerations which had influenced the development of rapid transit facilities in the different great cities of the world, and pointed out that as regards underground railways London was more favorably placed than Paris or Berlin, where military considerations had exercised considerable influence, or New York, Boston or Chicago, where serious geographical difficulties had to be encountered. The clay soil of parts of London had made both tunnelling and tube railways practicable, while, until quite recently, the solid rock on which New York is built was an obstacle for tube work, and extremely difficult for shallow subways. In Boston grave doubts were entertained by the engineers as to the successful issue of excavating the sandy soil upon which that city is built, and it was feared lest the work should undermine the foundations of buildings. Again, few people who knew Chicago immediately after the fire, and watched the enormous amount of pile-driving (reminding one of Amsterdam) which preceded the construction of the large public buildings and blocks of that city, would believe that at a level of 40 ft. below the surface an enterprising company had practically duplicated the street of the entire business district.

As to the merits or demerits of different methods of dealing with transportation, there was, Mr. Porter considered, little to be said when dealing with a city like London, which requires them all, and where (with the exception of freight tunnels) all methods are showing commendable activity. London could not afford to put all her eggs in one basket. The tubes were invaluable during the recent foggy days; while in the spring and summer, what a boon to many were the upper decks of the tramways! For short distances there were omnibuses, soon to be converted into motor road cars. For long distances there were, or would soon be, to a very much greater extent the undergrounds and electrified street railways. The battle for the London tubes seemed to have ceased since the appointment of the Commission, but the bills deposited for the coming session indicated that capital was still forthcoming to link up and extend London's underground electric railways.

Mr. Porter added that he was in no sense an advocate of any particular system of transportation for London. A complete survey of the subject involved the consideration of (1) street vehicles, (2) surface railways or tramways, (3) overhead railways, (4) shallow underground railways, (5) deep level railways, (6) deep level or tube railways for freight, (7) electrification of steam railways, (8) straightening and widening of streets and bridges, (9) construction of new thoroughfares and bridges, (10) improvement of regulation of traffic. All these methods had their place in the solution of the traffic problems of such a city as London. London had outgrown the period when the improvement of any one of these methods of dealing with the traffic could make a perceptible difference. As a matter of fact, while the Royal Commission had been taking evidence on all these points, and many others, such as suspended railways, mighty avenues running to all points of the compass, double deck streets and circular roads around the whole metropolitan area, those in charge of the several existing methods of transportation had been industriously studying how they could improve, extend and quicken their systems of transit. One witness, when asked by the Commission for his solution, answered very promptly, "London requires all the existing facilities." The important thing is to get these all to work in harmony. The unification of these several facilities by some common ownership or consolidation of management must, in his opinion, be precedent to any really satisfactory or lasting solution of the problem. The hope for such a settlement lay in the joint use of tracks, of stations, of passenger exchange from one line to the other when physical connection was impossible, and, even more than all else, in electrification, with the important economies that must come in the joint use of power.

Railroad Shop Tools.

(Continued.)

LATHES.

The accompanying illustration, Fig. 1, shows the 32-in. swing, screw-cutting engine lathe made by the New Haven Manufacturing Company, New Haven, Conn. The bed is strongly braced and is mounted on cabinets. The heads have a solid web under the cone pulley. The spindle is of crucible steel and runs in cast-iron boxes lined with babbitt metal. When desired, a hollow spindle having a hole up to $2^5/_{16}$ in. diameter can be furnished. The front bearing is 4¾ in. in diameter by 7½ in. long and the back bearing is 3¼ in. in diameter by 4½ in. long. The spindle is fitted with back gears and has a hardened steel bushing and check nut for taking up the end thrust. The cone pulley has five steps for a 4-in. belt. The tail stock is provided with a set-over for turning tapers; it is adjusted by means of a rack and pinion and is fastened to the bed by two bolts. The tail spindle has a tool steel center; it is 3¼ in. in diameter, and fits a No. 5 Morse taper. The carriage has long V bearings and is gibbed to both the front and back of the outside of the bed. It is provided with power, cross and lateral feed and a compound rest. The compound rest has a graduated base and is held in place by two bolts and is fitted with straps and studs for holding tools. The apron is made with double plates, thus giving the studs a bearing at each end. The reverse motions for the cross and lateral feeds are independent of the screw cutting, as they are communicated through trains of gearing engaging the rack pinion and are readily changeable for the backward or forward motion by means of the levers on the front of the apron. The thread of the leading screw is used only for screw cutting, and when cutting screws the pinion can be disengaged from the rack and thus prevent the liability of breakage by the turning feed becoming engaged through carelessness or accident. This machine swings 23 in. over the carriage and is made with beds ranging from 14 ft. to 20 ft. long. The distance between centers is about 6 ft. less than the length of the bed. The net weight of this machine fitted with a 14-ft. bed is about 9,000 lbs. The driving pulleys on the countershaft are 20 in. in diameter by 4½ in. face and they should run at about 83 r.p.m.

Fig. 2 shows a 30-in. screw-cutting engine

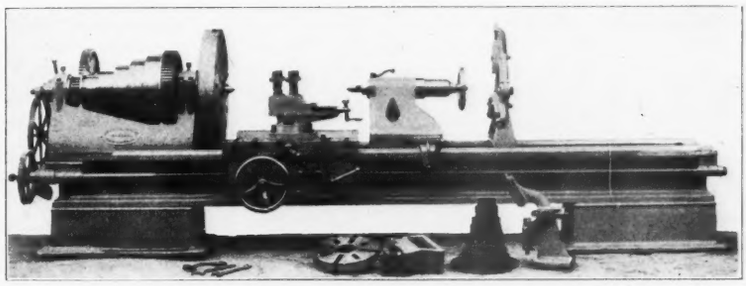


Fig. 1—The New Haven 32-in. Engine Lathe.

lathe made by P. Blaisdell & Company, Worcester, Mass. The bed is of broad box pattern stiffly ribbed. The spindle is of a hammered crucible cast-steel forging and runs in phosphor bronze boxes. The front bearing is 4¾ in. in diameter and the tail spindle is 3⅛ in. in diameter. The hole in the head spindle is 2⅛ in. and the maximum swing over the Vs is 31 in. and the swing over the carriage is 21 in. The drive is by a five-step cone pulley taking a 4¼-in. belt, the largest step is 19½ in. and the smallest is 6¾ in. in diameter. The ratio of the back gears is 16 to 1. The carriage has bearing surfaces at both the front and rear and it is fitted with a compound rest. Power, cross and angular feeds having graduated adjustments are also provided. The feed rod has an automatic stop and the screw can be disconnected by a clutch when not being used for screw cutting. Large and small face plates, center and follow rests, as well as a side block for turning the full swing of the lathe are supplied with this machine. The friction countershaft has 18-in. x 6¼-in. pulleys and should run at 125 r.p.m. The reversing mechanism for the carriage is placed under the head and it is controlled by the handle at the right of the apron. The tail stock is clamped to the bed by two bolts. The front bolt is adjustable so as to clear the handle of the compound rest. The rapid change feed box is placed under the head, as shown, and provides feeds from 7 to 250 to the inch.

The 18-in. swing lathe shown in Fig. 3 is made by the Draper Machine Tool Company, Worcester, Mass. This lathe was especially designed for both roughing and finishing on work from 1 in. to 6 in. in diameter. The head is strongly made and is provided with a single wide face pulley driven by a 6-in. double belt. There are five changes of speed in the head; these are obtained by four changes of lock gears, and with the two large pulleys on the countershaft the correct cutting speeds can be obtained for diameters from 1 in. to 6 in. The back gears are operated by the upright levers, shown. The spindle is of hammered crucible steel. It is provided with a 1¼ in. hole and it runs in round seated bronze boxes. The tail stock is well ribbed and is fitted with a large spindle. The carriage has a wide bridge and it is provided with a long bearing on the ways. It has a plain block rest with an extra large tool post for 1½-in. x ¾-in. tool steel. The apron is fastened to the carriage and it is of box form, giving all shafts having severe duty a bearing at each end. The inner bearing of the rack gear is bolted to the carriage at the point where it engages the rack. The gearing in the apron is of wide face and coarse pitch and all pinion gears are of steel bushed with bronze. The feed mechanism is made so that the operation of either feed locks out all other feeds and screw cutting. The feed is from a spliced lead screw, the thread of the screw only being used for screw cutting. The cross and lateral feeds are operated by the same friction, and the reverse mechanism for the turning feeds is in the apron. By means of a sliding key in connection with a nest of gears on the lead screw, three feeds or three screw pitches can be obtained without a change of gears. The bed is of deep box pattern with the sides tied together by heavy box girders. The countershaft has a third friction pulley for reversing when screw cutting. These pulleys as well as the boxes are self-oiling. This machine fitted with an 8-ft. bed will swing 4 ft. between centers. Large and small faceplates, center rest, etc., are supplied with the machine, and when desired a taper attachment can be furnished. This type of lathe is also made in a 22-in. and in a 24-in. size.

(*To be continued.*)

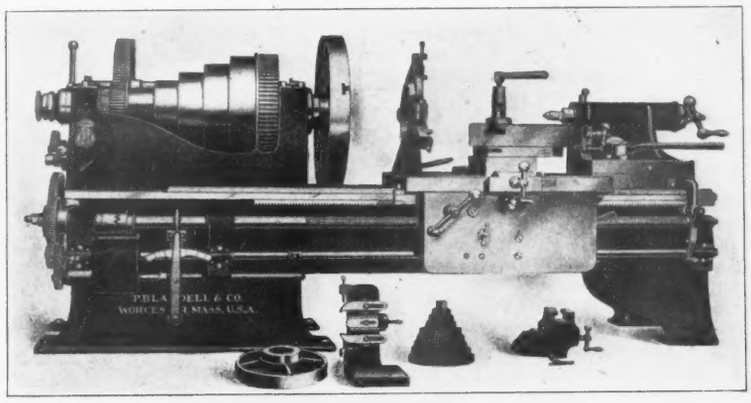


Fig. 2—The Blaisdell 30-in. Engine Lathe.

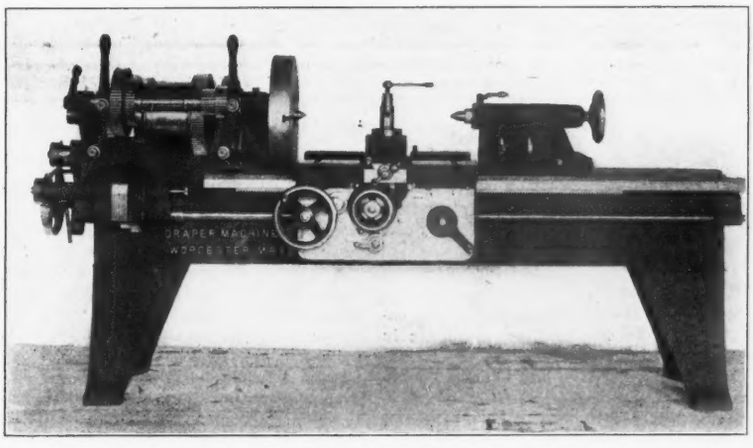


Fig. 3—The Draper 18-in. Engine Lathe.

Rails for Lines with Fast Trains.*

BY P. H. DUDLEY.

(*Continued from page 193.*)

Chapter 14 of the report summarizes briefly the experiments which have been made with a view to reducing the number of joints in track. While some roads have experimented with 60-ft. rail lengths, most of them have discontinued their use and gone back to 30-ft. lengths. The chief objections to the long rails are: first, that the opening between the ends of the rails allowed for expansion becomes so great during cold weather when the rails shorten up that the rail ends are injured by the hammering of the wheels in passing over the joints; second, that the long rails creep more than the 30-ft. lengths, and third, that more work is required to maintain line and surface.

The first objection would be obviated in part by not allowing as great a range of temperature for the supposed necessary expansion as has been the case for light rails. Several railroad companies have laid the 60-ft. rails with openings corresponding to a change of temperature of 120 deg. between the extremes of summer and winter. With the larger sections of rails, 85, 90 and 100-lb., this is more than is required. It could be reduced one-half, permitting the rails to abut closely when the temperatures were above 80 deg. Then the limited compression stresses would not be likely to cause the rails to render in the splice bars and expansion occur. It does not require, theoretically, any more resistance to prevent the entire rail length from expanding, than it does to prevent one linear inch from expanding. The practical difficulties are to prevent the springing out of line, either sidewise or vertically, of each individual rail. A compression of 6,000 or 7,000 lbs. per sq. in. for a short time, in the warmest portion of the day, would not be objectionable. The London & North

*Abstract of a report to be presented to the International Railway Congress, to be held in Washington, D. C., May, 1905.

Western use 60-ft. rails, keyed in their chairs, and do not experience any difficulty from expansion. Their bull-head rail does not require to be cambered.

The longer rails cannot be finished as smoothly in the mills as the shorter lengths. It is impossible to do this, for while the mills can make facilities for handling such long rails, the camber required for a 60-ft. rail on the hot bed is from 30 to 40 in., while for a 30-ft. rail it is only 6 to 8 in. In the recalescence of the base and head of the rail on the hot bed, the free movement is restricted, and the curving backwards and forwards is not done uniformly, and the rail goes from the hot beds with several irregular curves both in the surface and sides. These must be removed under the straightening press, the 60-ft. rails requiring proportionately more gagging than the shorter lengths, and they do not have a smooth finish. While this does not appear in the surface, yet in the rolling of the wheels of the locomotives and cars passing over the rails, the undulations in the track are increased. The spikes are loosened sooner in the crossties, and the rails run under the movement of the trains. Only two crossties for 60-ft. rails are spiked, to prevent running, while in two 30-ft. rails there are four crossties, which are sufficient to check the running, as compared with the 60-ft. lengths. For their use, a more efficient fastening than the ordinary spike is required to prevent running.

None of the roads which replied considered it advisable to attempt to weld the joints as is done on street railway track laid in paved streets, chiefly because of the difficulty of holding the rails from bending sideways under expansion stresses. In street railway track, the solid pavement surrounding the rails prevents this in a great measure. Welding the ends either with molten metal or by electricity seriously affects the structure of the steel in the rails because of the intense heat required for welding by either process. Under the severe shocks of steam roads, many of the rail ends would break.

Chapter 15 takes up the question of creeping rails and methods in use for preventing this movement. In general it may be said that the creeping of rails is caused by the elasticity of the roadbed and not altogether by the effect of certain types or weights of rolling stock and locomotives. All cases of creeping rails which have been investigated carefully, show that the amount and nature of the movement is influenced by the nature of the roadbed and the section of the rails. The heavier rail sections show less displacement than the light sections due to their greater stiffness under passing loads. Anti-creepers and other temporary expedients will not wholly prevent the movement of the rails but any improved method of fastening the rails securely to every tie would have a decided effect in restricting movement. The only sure way of preventing creeping is thorough draining of the roadbed, and, if necessary, increasing its stability and solidity with new filling which will not move under passing loads.

An interesting phenomenon observed in a number of cases of creeping rails is the fact that the rails slip in the direction of traffic and that if the right-hand crank of the locomotives leads, the left-hand rail slips at a faster rate and *vice versa*.

Chapter 16 summarizes the conclusions reached by the reporter in investigating the subject of Rails for Lines with Fast Trains.

1. The subgrade is the foundation which must sustain eventually the effects of the moving loads, as distributed through the wheel contacts to the rails, crossties and ballast, and is loaded and unloaded for the passage of each train, and partially for each wheel. An improvement in loading the foundation and thereby increasing its stability, is followed by an advance in transportation.

2. What the bending moments will be for a definite construction of the superstructure of the permanent way, is independent, partially, of the total load of the locomotive or car, but is dependent upon the type of each, in construction, wheel base and wheel spacing. This permits comparisons to be made between the different types, and shows relatively their efficiency in loading the foundation.

3. The rail section on flexible supports, under rolling loads, resolves the wheel effects in the "general depression" into minor negative and major positive bending moments. The negative bending moments are produced in the wheel spacing, increasing in amount the positive bending moments under the wheels as the stiffness of the rail section increases, or within the limits of construction, as the wheel spacing decreases, constraining and reducing the positive bending moments.

4. It is the moving wheel spacing and loads which become the chief controlling and constraining points of the bending rail, instead of the crosstie spacing. The crossties furnish direct conjoint support under the portions of the rail having, for the instant of the passing wheels, positive bending moments; the support decreases under the negative moments.

5. The total load of the locomotive or cars being distributed only to the rails through the wheel contacts, the foundation is not loaded uniformly per square foot of the area covered by the wheel base, as in the foundation for buildings. The greatest intensity of pressurre to the crossties, ballast and foundation, occurs near or directly under the moving wheels.

6. Limber rails under the wheel loads have large unit fiber strains, though small capacity for bending moments; therefore, the individual wheel loads are not distributed, but are concentrated in passing over each crosstie, ballast and foundation.

7. Stiffer rails under the wheel loads, without increase of unit fiber strains, have capacity for large bending moments, relieving each crosstie, the ballast and foundation underneath, by a distributed instead of a concentrated wheel load.

8. The unit fiber strains for a given wheel load decrease, as the stiffness of the rail section increases, and therefore the capacity to carry larger bending moments is augmented. This distributes the wheel effects through the positive and negative bending moments to a greater length of the rail, or produces more efficient constraint, and reduces the intensity of pressure on the crosstie near or directly under the wheels.

9. The intensity of the pressure between the wheel contacts and rail head is increased over that for the same wheel load on limber rails, and if provision is not made for this extra service by a higher grade of metal, an increased rate of wear occurs.

10. The large bending moments carried in stiff rails hold the running surface for the moving locomotive with limited specific deflections under the wheels. The portion of the rails is loaded favorably, not only by the truck and tender wheels, for constraint of the heavier loads of the driving wheels, but the foundation is restricted also in its movements.

11. The efficiency of the rail section as a sion" is not constant, but varies with the "constrained beam" in the "general depres-type of locomotive passing over the same section, and other elements of the permanent way.

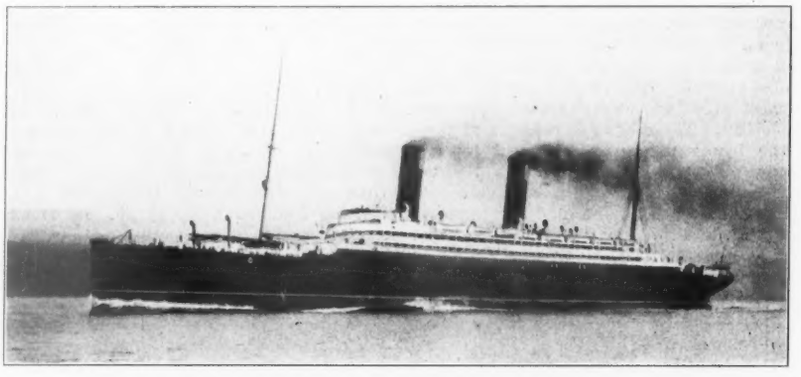
12. The distribution of the expended tractive effort, through the drawbar-pull, may be extended in 6-in., 100-lb. rails, to all of the wheels under the locomotive. In the 80-lb. rails, this reduces to about two-thirds of the length of the total wheel base of the locomotive.

13. Well designed splice bars, by their friction in the rail ends, aid in continuing the bending moments under the passing locomotives and cars from one rail to the next.

14. The reason why greater advance has not been made in the engineering problems pertaining to the track, has been the impossibility of calculating the forces and unit fiber stresses in the rails, and without positive measurements for comparisons, confusion exists as to the relations and principles between the locomotives, cars and the permanent way.

The New Cunard Steamship Caronia.

The accompanying illustration shows the new Cunard twin-screw steamship Caronia as she appeared on her trial trip. She was built by Messrs. John Brown & Company, Clydebank. Her keel plate was laid on the 21st of September, 1903, and in 9½ months she reached the launching stage. She was christened by Mrs. J. H. Choate, the wife of the United States Ambassador to Great Britain, and on February 25 left Liverpool on her maiden voyage, and arrived at New York after a passage of 7 days and 9 hrs., making an average speed of 16.33 knots There are eight continuous decks on the Caronia, and the distance from the keel to the upper or boat deck is 80 ft. The distance from the keel to the bridge is 97 ft. She carries a crew of 440, and she has accommodations for upwards of 3,100 passengers. The principal dimensions of the Caronia are: length over all, 675 ft.; beam, 72 ft. 6 in.; moulded depth is 43 ft. 9 in. When fully loaded she draws 33 ft. of water. Her gross



The New Cunard Steamship Caronia.

tonnage is 21,000 tons. Her engines are of quadruple expansion type and develop from 21,000 h. p. to 23,000 h. p. The low pressure cylinders are 110 in. in diameter and have a piston stroke of 5 ft. 6 in. During her trial trip the Caronia attained a speed of 19.51 knots. The ship was not designed for an ocean greyhound; she is essentially a passenger steamer, although her cargo capacity is larger than the other Cunarders. When broken in she will probably maintain an average speed of 18 knots.

New Station of the Reading at Harrisburg.

The Philadelphia & Reading has recently completed its new passenger station at Harrisburg, Pa. The accompanying illustration shows the handsome appearance of the building, which is of buff brick with terra cotta and Indiana limestone trimmings. In the front of the building on the second and third floors are offices, and in the back the main waiting room is open to the roof. There are four stub tracks separated by two covered platforms 16 ft. wide and 300 ft. long, which are on the ground floor level. The main waiting room is 77 ft. x 48 ft. 4 in., and is reached from the portico entrance by a lobby flanked on each side by a smoking room and men's toilet and a ladies' retiring room. The baggage rooms and restaurant are in the rear between the main waiting room and the covered concourse. The station faces on Market street, west of Tenth street, and adjoins the company's new freight terminals, which were finished some time ago.

We are indebted to Mr. William Hunter, Chief Engineer of the Reading, for the photograph and information.

New Passenger Station at Harrisburg, Pa.—Philadelphia & Reading.

Superheated Steam in Locomotive Service.*

Beginning with a discussion of the characteristics of superheated steam, Dr. Goss called attention to its use in this country many years ago. The work of Isherwood and of Dixwell had left no doubt in the minds of American engineers concerning its favorable effect upon the economic performance of the steam engine, but the maintenance of the superheater had been attended with so many difficulties that its use had gradually been abandoned. For a long period, the subject of superheated steam in engine service had received little or no attention from American engineers. More recently, however, there has been a revival of interest in the subject which appears to have had its origin in the work of certain foreign engineers. In Germany for more than a decade, experiments in the use of superheated steam on a large scale have been vigorously pursued. German technical schools have for ten years or more, possessed superheaters as a part of their equipment in steam engineering, and in their practice as well as in their study, the Germans have been and still are devoting themselves to the solution of this problem. Among those who have had a conspicuous part, perhaps none have been more energetic or successful than Herr Wilhelm Schmidt. Some ten years ago, Herr Schmidt began the introduction of stationary boilers and engines designed for the generation and use of superheated steam. Encouraged by his success in this field, he extended the application of his system to locomotives until some 50 or more locomotives using superheated steam are now in regular service on the Prussian State Railways. It is claimed that the performance of these engines is 25 per cent. better than that of similar engines using saturated steam. Moreover, an investigation of the problem shows that those conditions which in stationary practice have operated to make difficult the maintenance of the superheater do not exist in locomotive service. Inspired by German success, American builders and railroad companies have entered upon a period of cautious experimentation. A number of locomotives having superheaters are now in operation in this country and in Canada, while several of the larger American roads in ordering new equipment have provided generously for machines of this class.

The types of superheaters which have given satisfaction in German practice are the Schmidt and the Pielock, while in this

*Abstract of paper presented before the Franklin Institute by W. F. M. Goss, D. Eng., Dean of the Schools of Engineering, Purdue University, Lafayette, Indiana.

country the use of the Schmidt locomotive has been followed by that of the American Locomotive Company, designed by Mr. F. J. Cole, Mechanical Engineer of said company.

All evidence is to the effect that the employment of superheated steam materially improves the efficiency of the locomotive. Again, in the performance of the locomotive, anything which improves its efficiency may be utilized to extend its limit of power, hence, it may be shown that the adoption of superheated steam will yield a material increase in the capacity of the modern locomotive.

Summarizing the statements and demonstrations of the paper, it appears that from an academic point of view the conditions of locomotive service are very favorable to the use of superheated steam; that its use makes possible a better distribution of steam; it greatly improves the economic performance of the engine and it increases its power; that the maintenance of the superheater is not likely to be serious nor is any trouble to be expected in securing satisfactory cylinder lubrication; that the adoption of superheated steam in locomotive service will not be attended by greater difficulties than those which must be overcome in the introduction of any other important detail of locomotive construction; and that substantial progress has already been made in the application of the principle involved.

The East Boston Tunnel.

On the 31st of last December, the first train carrying passengers passed through the new East Boston tunnel, which is a part of the Boston system of subways, and passes under the harbor, uniting Boston and East Boston. The act authorizing the building of the tunnel was signed June 10, 1897. The first contract was made in April of 1900, and construction was begun soon after. The completion of the tube has therefore required almost five years, during which good average daily progress has been maintained. Considering its magnitude, the work has been remarkably free from accidents and has been carried on with practically no injury to adjacent property.

Starting at Maverick Square in East Boston, the tunnel passes under Lewis street, Boston Harbor, Long Wharf, State and Court streets to Scollay Square in Boston, where connection is made with the Boston Subway. Three passenger stations are provided, located for the most convenient connection with existing surface and elevated lines. The work, in part, was pushed under some of the busiest streets of the city, with but little interference to traffic. The total length of the tunnel is approximately 7,500 ft., of which about two-thirds was built by the shield method, the remainder being built in open cut excavation. The portion of the bore actually under the water of the harbor is about 2,700 ft. long, the rest of the tunnel portion passing through "made ground" filled in many years ago. Test bores were made along the line of the tunnel, so that the materials to be penetrated were known in advance with reasonable accuracy. A depth greater than at present essential was demanded by the fact that allowance had to be made for possible dredging of the harbor to make a 40 ft. channel. To meet this condition different grades were required in the tube. For the first 2,100 ft. from Maverick Square the tunnel descends by a 5 per cent. grade; for the next 2,100 ft., reaching almost across the harbor, an ascending grade of 0.5 per cent. is maintained; then follows a length of 1,000 ft. at 2.5 per cent., 1,800 ft. at 4, 2.5 and 1.5 per cent., and the final rise on a 3 per cent. grade for about 500 ft. The greatest depth attained by the tunnel invert is about 80 ft. below mean low water. The least thickness of earth between tunnel and water is 18 ft. The cross-section of the tunnel varies at different points but in general is a full circular arch with vertical side walls. Reinforced concrete construction was used throughout. Ventilation is provided by powerful fan plants forcing fresh air from either end and electric lighting is used for the entire length.

For construction purposes the line was divided into six sections, lettered from A to F. Of these, sections B and C were driven with shields under air pressure; the other sections were built in open cut. The methods used in open cut work were in general those of common practice, with no novel features, the streets being excavated from the surface and the concrete tube built in position, the timber forms being left in place for 30 days before filling in. This construction differed from that used in the New York Subway, in that concrete was used entirely instead of the steel structure adopted in New York.

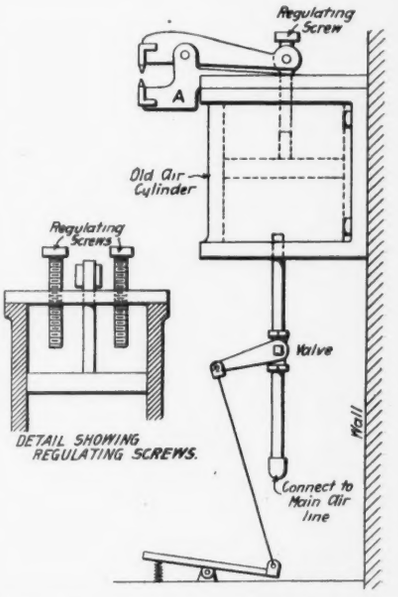
Sections B and C aggregate 5,150 ft. in length, and formed the major part of the contract. Section B, 4,400 ft. long, was started at a shaft in Lewis street and was driven by the pneumatic shield method under air pressure for almost the entire distance. Three air locks were put in; the one near the top of the tunnel section was used almost exclusively by the men and the two lower ones for removing the excavated material.

The side walls of the tunnel were built in advance of the shield in lateral headings. The roof shield, a heavy structure of steel work, was forced forward by powerful hydraulic jacks, being supported on rollers resting on plates on the walls. The air pressure required averaged about 22 lbs., the maximum being sometimes as high as 27 lbs. The volume of free air delivered to the headings averaged about 20 cu. ft. per minute for each workman, and it was forced into both side drifts and above the shield, as well as in front of it. The compressing plant for this section included three Ingersoll-Sergeant air compressors; two low-pressure straight-line single-stage Class "A" machines furnishing air for the working chamber in the shield; and one high-pressure, straight-line, two-stage Class "AC" machine delivering air at a pressure of about 115 lbs. This high pressure air was used in pumps operating the hydraulic jacks for moving the shield, developing a pressure of 4,000 lbs. per sq. in., applied in the 16 jacks of 75 tons capacity each. This air was also used in driving motors running concrete mixers, winding engines, and other devices; while a portion was discharged directly into the advance headings for ventilation. The combined free air capacity of these three compressors was something over 2,500 cu. ft. per minute, and they were driven by steam from a battery of three 100-h.p. boilers.

Section C, 750 ft. long, included that portion of the line between Atlantic avenue and India street. The method of tunneling was in general that used in Section B, starting from a construction shaft near the Custom House. The shield used here was very similar to that in the other tunnel section and was manipulated in the same manner. Three air locks gave access to the working chambers. The air pressure in front of the shield averaged about 18 lbs., and the compressed air for this section was supplied by four Ingersoll-Sergeant steam-driven air compressors. Of these, two were straight-line, high-pressure, Class "AC" machines, having a combined capacity of about 1,500 cu. ft. of free air per minute, delivered at 120 lbs. pressure. The other two were low-pressure machines of straight-line Class "A" type, with an aggregate free air capacity of 2,300 cu. ft. per minute, compressed to 40 lbs. The low-pressure air gave ventilation and pressure in front of the shield; the high-pressure air served as a motive for pumps, winding engines and other appliances. The total cost of the tunnel exceeded three million dollars, and the work was completed within the estimated time. The opening of the tunnel has reduced the time of transportation between Boston and East Boston by more than ten minutes.

Pneumatic Shears for Cutting Clamp Bolts on Air Brake Hose.

A simple but effective device used at the Meadow shops of the Pennsylvania Railroad for cutting the clamp bolts on old air-brake hose is shown in the accompanying illustration. It is made of an old air cylinder, the upper head of which has been removed and replaced by a forged steel head



Pneumatic Shears for Cutting Bolts on Air Brake Hose.

as shown. This head and the lower part "A" of the shear are forged in one piece. The upper part of the shear is connected to a short piston rod as shown. The stroke of the piston is regulated by two adjusting screws; these screws project through the head and into the cylinder and act as a stop to the piston on its up stroke. As the cutters wear off these screws can be raised and thus give a longer stroke to the piston, which in turn will give the jaw a longer stroke and cause the cutters to come together. The air is taken from the main air line and the machine is operated by a foot lever connected to a valve as shown. This device can be attached to the wall or shop post, or a stand can be made for it at but little expense. The cutters are 2½ in. wide, and by placing a bolt in each side of the cutter two bolts can be cut with one stroke of the piston.

When the second-track laying is completed on the Trans-Baikal Railway the capacity of the line will be increased to forty trains a day in each direction. A special committee from the Russian Ministeries of Ways, Finance and State Control is at work determining the supplementary improvements necessary.

ENGINEERING SOCIETY LIBRARY, UNIVERSITY OF MICHIGAN

GENERAL NEWS SECTION

NOTES.

The legislature of Indiana has passed a law to establish a state railroad commission. Three commissioners are to be appointed by the Governor and the board is to have power to correct rates which are formally complained of.

A Chicago despatch says that the railroads west of that city have decided to ignore the recent order of the Interstate Commerce Commission requiring the rates on live stock to be no higher than those on meats and other cattle products.

The shops of the Baldwin Locomotive Works, at Philadelphia, are now running on full time and turning out seven engines a day. More than 15,000 men are at work and the orders on hand are sufficient to keep the shops running for several months.

Extraordinary efforts are being made to clear up the congestion of freight which has existed on the Pennsylvania lines for weeks past; and the interchange of freight cars between the Pennsylvania lines east of Pittsburg and those west for the first five days of March exceeded the exchange for the corresponding period of 1904 by 6,906 cars.

Mr. W. L. Park, General Superintendent of the Union Pacific, is reported as saying that he intends to employ Japanese laborers on track repairs throughout the Union Pacific lines. Mr. Park has for the last five years been Superintendent of the Wyoming division, and from his experience there believes that the Japanese are the most temperate and faithful men who can be found for that kind of work.

The St. Louis, Brownsville & Mexico Railroad of Texas, of which Mr. B. F. Yoakum is President, has arranged for the sale of five-acre and ten-acre homesteads to its employees, to be paid for in installments extending over 10 years. It is proposed that in the case of the employee's death the property shall be deeded to his wife, or heirs, in fee, without further obligation. To employees leaving the service money which has been paid will be refunded with interest.

A press despatch from Springfield, Ill., says that in the United States court on March 2 the suits brought against the Southern Railway, the Illinois Central and the Wabash for using cars not equipped with automatic couplers, in accordance with the law, were all decided in favor of the Government. There were nine counts against the Southern, three against the Illinois Central and one against the Wabash. The fines were $100 and costs on each count. The case pending against the Chicago & Alton is still undecided.

The volume of passenger traffic to the city of Washington for the presidential inauguration last week was heavier than ever before, and the multitude of trains so crowded the railroad stations and yards that a large proportion of them were delayed many hours. The Pennsylvania delivered into Washington between midnight on Thursday and Saturday noon 1,229 cars of passengers (34 cars per hour). This was an increase of 85 per cent. over the number handled at President McKinley's inauguration four years ago, and an increase of 50 per cent. in the number of trains. The Baltimore & Ohio showed an increase of 60 per cent. in cars handled and 35 per cent. in the number of trains. On Sunday, the 5th, when a majority of the sightseers were ready to go home, it is said that 15,000 persons applied for seats on the Congressional Limited express for New York, a train on which no reduced fare tickets are accepted.

Mr. Delano.

Burlington directors have voted $18,000, the amount of a year's salary, as a gift to F. A. Delano, who recently retired from the general managership, in token of their appreciation of his work. Mr. Delano is the most prominent candidate for the Presidency of the Metropolitan Elevated.—*Chicago Press Despatch.*

General Managers' Association of Texas.

The officers of this association are: President, Chas. Hamilton, Vice-President and General Manager of the Texas Central: Vice-President, D. B. Keeler, Vice-President and Traffic Manager of the Fort Worth & Denver City; Counsel, Hon. Jos. D. Sayers. Executive Committee, Thornwell Fay, G. H. & S. A.; S. B. Hovey, C., R. I. & G.; W. C. Nixon, G. C. & S. F.; L. S. Thorne, Texas & Pacific, and Leroy Trice, I. & G. N.

Interstate C. C. Decisions.

The Interstate Commerce Commission has announced its decisions in cases against the Southern Railway and the Illinois Central involving the question of the unreasonableness of an advance of two cents per 100 lbs. on lumber from southern points to Ohio river destinations. In the first (Tift) case the advance made June 22, 1903, was two cents over rates made on Sept. 8, 1899, on which date advances of one cent and two cents had been made over the rates of May 17, 1895. The rates prior to the advance complained of were remunerative to the carriers. The Commission holds that the advance is not warranted; also that it was the result of concerted action by defendants and other carriers; and while the question whether such concert of action is in violation of the "Anti-Trust Act" is for determination only by the courts, it is the duty of the Commission to consider whether the advanced rates resulted from untrammeled competition, or were fixed by concert of action or combination of the carriers. The Commission further holds that the test of the reasonableness of a rate is not the amount of profit in the business of the shipper or manufacturer, but whether the rate yields a reasonable compensation for the services performed. The rates on lumber prior to the advance complained of are found to have been reasonably high when compared with the rates on other commodities which are at all analogous to lumber in respect to value, volume, risk, cost of handling, and other conditions affecting the traffic. Numerous other reasons are stated in support of the main ruling. The other complaint was of an advance in the rates on lumber in carloads from points in lumber-producing territories east of the Mississippi river in Louisiana, Mississippi and part of Alabama, to Ohio river points. The decision is substantially the same.

In the case of the Duluth Shingle Company against the Duluth, South Shore & Atlantic, and other railroads, the Commission has announced its decision, holding that the defendants, by charging a higher rate on shingles than on lumber, in carloads, from Duluth to Chicago, unjustly discriminate against shingles in favor of lumber, subject shingle shippers to undue prejudice and afford undue preference to other places from which shingles are carried as low as lumber.

The Interstate Commerce Commission, in an opinion by Chairman Knapp, has announced its decision in the case of the Richmond Elevator Company against the Pere Marquette Railroad. The Commission holds that it has no jurisdiction in cases merely showing delay or negligence in receiving, forwarding or delivering property offered for transportation, including the furnishing of cars, but that the regulating statute does prohibit any unjust discrimination or wrongful prejudice in the provision of cars or other transportation facilities. The Commission further holds that every shipper is legally entitled to fair opportunity and treatment in the use of railroads as public utilities, and any discrimination which in substantial degree deprives shippers of such use must be considered unjust, unless forced by justifying conditions. In such case the burden of proof is upon the complainant to the extent of showing discrimination, and then upon the carrier to show that the discrimination was justified.

The Commission decides that in furnishing cars the carrier unjustly discriminated against the complainant, which desired to ship hay from various points in Michigan, but that the proof fails to indicate with any degree of certainty the damage caused by the wrongful discrimination. The complainant is given until April 1 to apply for further hearing.

Los Angeles-Pacific Railroad.

Owing to the greatly increased traffic on the interurban railway system of the Los Angeles-Pacific Railroad Company, the officers of that company have decided to increase the capacity of their central power house at Vineyard and to install an additional sub-station in Los Angeles. The new electrical equipment has recently been contracted for with the Crocker-Wheeler Company through its Pacific Coast managers, the Abner Doble Company, of San Francisco. The contract comprises one 1,200 k.w., three-phase, 50-cycle, 2,300-volt, engine-type generator with a speed of 125 r.p.m.; one 300 k.w. motor-generator set; one 400 k.w. motor-generator set; three 400 k.w. transformers; three 160 k.w. transformers; three 120 k.w. transformers, and a 60 k.w. engine-type exciter. The 1,200 k.w. alternator will be of the Crocker-Wheeler Company's new revolving-field type. The generator will be driven by a 2,000 h.p. compound-condensing McIntosh & Seymour engine. The motor-generator sets will consist of 2,300-volt synchronous motors driving 600-volt direct-current railway generators. The transformers will be built for 15,000 volts on the primary and 2,300 volts on the secondary and will be of the new water-cooled and oil-insulated type.

The interurban railway system of the Los Angeles-Pacific Railroad Company includes nearly 200 miles of line. The President and Manager of this system, E. P. Clark, was one of the pioneer railroad men of southern California and he has seen this road develop from a very small beginning to its present position. The system extends from Los Angeles in a fan shape to Santa Monica, Ocean Park, Playa del Rey, Hermosa, Manhattan Beach, and Redondo on the ocean, and passes through the intermediate towns of Hollywood, Colegrove, Sawtelle, Sherman, and

Palms. In other words, the lines cover thoroughly the territory lying south of the Santa Monica Mountains and between Los Angeles and the ocean. Most of the lines have been double-tracked and are built in conformity with the best steam railroad practice. About a year ago a new central steam plant was installed at Vineyard about five miles west of Los Angeles, and from this station transmission lines at 15,000 volts carry the power to several sub-stations located at intervals over the system. It is to increase the capacity of this central station and to supply additional power for the operation of the lines in Los Angeles that makes necessary the additional machinery mentioned.

Rates on Oranges from California.

The Interstate Commerce Commission in an opinion by Commissioner Clements has rendered its decision in the California orange cases, brought by the Southern California Fruit Exchange *et al* against the Southern Pacific and the Atchison. This decision is upon questions reserved in a former decision. The carriers' minimum carload weight of 26,000 lbs. on citrus fruit in refrigerator or ventilator cars to eastern destinations is held not unreasonable with the 40 ft. car in general use. Whether or not the regulating statute applies to refrigeration charges in all cases, the defendants, by compelling shippers to pay icing charges on citrus fruits as established by the car lines or do without necessary refrigeration for the traffic, have made these charges a part of the cost of transportation and subject to regulation under the law. The refrigeration charges have been reduced during the pendency of this proceeding, and the present charges are not found to be unreasonable. The defendant carriers are unlawfully engaged in pooling the traffic in citrus fruits originating in southern California and carried by them and their connections to eastern markets, but further action upon that branch of the proceeding is reserved by the Commission, in view of the pendency in the United States Supreme Court of an appeal from a like decision of the circuit court for the Southern District of California, in a suit brought by the Commission.

The defendant carriers' present rate of $1.00 per 100 lbs. on lemons in carloads from southern California to points on and east of the Missouri river is apparently reasonable, but the rate of $1.25 per 100 lbs. on oranges C.L. to points on and east of the Missouri river is unjust, and should be reduced 15 cents; but if the time of service to eastern markets should be restored to the old basis as indicated by eight days to Chicago and 12 days to New York, a rate as high as $1.15 would perhaps be fair and reasonable.

Commissioner Prouty concurs in the proposed order and recommendation of the Commission, but does not agree with some of the facts found and conclusions drawn in the majority opinion. Such concurrence is based mainly upon the ground that the $1.25 rate on oranges is unreasonable because the time of service in transporting these fruits to eastern markets has been greatly lengthened.

Chairman Knapp dissents from the decision. He says that in several important particulars the findings in the majority report do not accord with his understanding of the proofs, while the inferences therein drawn are not warranted, in his judgment, by due consideration of all the facts and circumstances entitled to be taken into account; and further that even if the specific findings in the majority opinion be accepted as a fair and adequate summary of the facts and circumstances entitled to be considered, he is still constrained to hold that the unreasonableness of the rate has not been established.

New Service Between Canada and France.

Announcement is made that a contract has been signed by the Canadian Government and the Allan line of steamships for a service between Canada and France, beginning with the opening of navigation this spring and extending to the opening of navigation in 1908. During the season when the St. Lawrence is open, Montreal and Quebec are to be the Canadian ports of call, with Halifax or St. John during the winter. The French port reached will be Cherbourg or Havre. The contract provides that there shall be not less than 18 trips a year, and that from May to November inclusive there shall not be less than two round trips a month. For 18 voyages Canada will pay an annual subsidy of $100,000, with the option of requiring six more voyages per year at a proportionate rate. Four of the older and smaller steamers of the line, vessels of approximately 4,300 gross tons, will perform the service. It is provided that each eastbound trip may be extended at will to British ports, but that the first port of call after leaving Canada shall be a French port and the last port of departure for Canada shall be a French port.

American Railway Appliance Exhibition.

Since the publication of the list of exhibitors in the *Railroad Gazette*, last week, the following firms have secured space. Applications should be made to J. Alexander Brown, Secretary and Director of Exhibits, 160 Broadway, New York:

American Engineer & Railroad Journal, New York.
Ashcroft Manufacturing Co., New York.
Booth Water Softener Co., New York.
Central City Forge & Iron Co., Cleveland, O.
Cleveland Frog & Crossing Works, Cleveland, O.
Coe, W. H., Mfg. Co., Providence, R. I.
Commonwealth Steel Co., St. Louis, Mo.
Consolidated Safety Valve Co., New York.
Devoe, F. W., & C. T. Raynolds Co., New York.
Ewald Iron Co., St. Louis, Mo.
Fuller Bros. & Co., New York.
Hall Signal Co., New York.
Hayden, N. L., Mfg. Co., Columbus, O.
Homestead Valve Co., Pittsburg, Pa.
Jones, B. M., & Co., Boston, Mass.
Magnus Metal Co., Buffalo, N. Y.
Mason Regulator Co., Boston, Mass.
Middletown Car Works, Middletown, Pa.
Morse Twist Drill & Machine Co., New Bedford, Mass.
National Ry. Publication Co., New York.
Niles-Bement-Pond Co., New York.
Osgood, Bradley & Son, Worcester, Mass.
Railway & Locomotive Engineering, New York.
Raymond Concrete Pile Co., Chicago, Ill.
Scranton Bolt & Nut Co., Scranton, Pa.
Southern Exchange Co., New York.
United & Globe Rubber Mfg. Co., Trenton, N. J.
Underwood, H. B., & Co., Philadelphia, Pa.
United Injector Co., New York.
Westinghouse Auto. Air & Steam Coupler Co., Pittsburg, Pa.
Wood, G. S., Chicago, Ill.

Acetylene Lights in Stations and Signals.

The Commercial Acetylene Company, 80 Broadway, New York City, has contracted to furnish acetylene gas to light the Union Passenger Station at Binghamton, N. Y. The gas will be made at the Commercial Company's works at Harrison, N. J., and carried to Binghamton in tanks. This illuminant is used in the station of the Delaware & Hudson Company at Saranac Lake, N. Y., and also in a number of stations on the El Paso & Southwestern. The Southern Indiana is to use it in the new stations which it is now building.

The station of the Chicago, Rock Island & Pacific at Morris, Ill., has been lighted with this gas for about a year and the marked saving, as compared with oil gas formerly used, is already well known, from statements published before now.

Besides being used in buildings and on many passenger cars and yachts, the Commercial Acetylene Company's safety storage system has now taken the place of the former oil lamps on a number of signal bridges on the Pennsylvania Railroad. Signal bridge No. 482, near North Philadelphia, on the New York division, has eight lamps each using one-eighth of a cubic foot; and the amount thus consumed is so small that the supply contained in one tank serves to light the signals continuously for five months, night and day. The lamps are never extinguished and require cleaning only once in two months. The locomotive enginemen report that these lights are visible much farther than the oil-light signals ordinarily used.

Congressional Investigation of Rates.

The result of the winter's discussion of railroad matters in Congress is a resolution, passed by the Senate, directing the Senate Committee on Interstate Commerce to conduct an inquiry into rates during the recess of Congress. The resolution instructs the committee, or a subcommittee thereof, to sit during the recess of the Senate, at such times and places as may suit the convenience of said committee or sub-committee, to consider the question of additional legislation to regulate interstate commerce and to authorize the Interstate Commerce Commission to fix rates of freights and fares and to acquire further information as to interstate commerce, including violations or evasions of the anti-rebate law and the devices and methods by which such evasions are accomplished, and including refrigerator and other private car systems, industrial railway tracks, switching charges and the like. Said committee or sub-committee is authorized to employ experts, and send for persons and papers; and is to make a full report within ten days after the meeting of the next Congress.

Chairman Elkins has called a meeting of the committee for March 10, when the program of the meetings of the committee will be discussed. It is expected that the committee will meet in April for extensive hearings.

A Long-Felt Want.

Notwithstanding the conveniences and comforts enjoyed on our modern railroad cars there is still something lacking, and that is a gymnasium car. After riding in a car for several hours the body and limbs become cramped and it is with difficulty that one begins to walk. Sometimes the fatigue of a long journey is felt for several days. This could be obviated and travel made a source of healthy recreation and comfort if such an innovation was put in vogue.

What is a person to do during several hours' journey in a railroad car? Reading in cars is detrimental to the eyes, and gazing at swift passing objects is also straining on the vision. Eye specialists advise people to close their eyes and become acquainted with themselves. But then to sit and philosophize for hours becomes monotonous; for the mind, too, needs recreation and rest. This, then, would be the proper time to take some physical exercise and a little walk—for which this car could also be used.—*Albany Evening Journal.*

M. C. B. Association Circulars of Inquiry.

The Committee on Subjects of the Master Car Builders' Association has sent out a circular asking for suggestions for topics for noon-hour discussions at the convention next June and subjects for committee investigation during 1905-1906, to be reported on at the convention of 1906. Replies should be sent to J. S. Chambers, Supt. of M. P., Atlantic Coast Line, Wilmington, N. C., who is chairman.

The Executive Committee of the Association has referred to the standing committee on tests of M. C. B. couplers for consideration the following subjects: The adoption of a standard coupler; standardizing the pivot pin and material used in its manufacture; improvement in uncoupling arrange-

ment for couplers. This committee has sent out a circular containing a number of questions relating to the subjects to be considered, and replies should be sent to R. N. Durbarrow, Supt. of M. P., Pennsylvania Railroad, Altoona, Pa., who is chairman.

Planting Timber for Cross-Ties on the Pennsylvania.*

The number of cross ties in use on the railroads of the United States is estimated to be about 620,000,000; the number used annually for repairs and for extensions of track is estimated to be from 90,000,000 to 110,000,000, requiring, we may say, the entire product of 200,000 acres of woodland annually.

Each year the timber from which these are manufactured is farther from the base of transportation; many of the former sources of supply already have been entirely exhausted. Our Pennsylvania railroads now look chiefly to inland Virginia, West Virginia and Kentucky for our white oak ties, and the longleaf yellow pine of the southern states will soon disappear—probably another decade may nearly close these sources of supply.

The annual consumption of ties on the Pennsylvania Railroad system east of Pittsburg and Erie, for repairs only, is about 3,000,000, the latter being about the average quantity used every year for repairs in the past ten years. To this should be added, say, 500,000 used annually for new work. It is evident, therefore, that at the present rate of consumption the available supply of the present timber used, especially white oak and yellow pine, will be depleted to a serious degree before many years, and that the time is now ripe for the railroads to consider the question of what course they are to pursue in the future.

As long as 24 or 25 years ago, on the Pennsylvania Lines West of Pittsburg, attention was already given to the subject and a number of catalpa trees were planted along the right of way of one of its lines, but the results obtained were unsatisfactory.

More recently the cultivation of the yellow locust as a tie timber has been brought to our attention and the cultivation of this tree to a limited extent, for the purpose named has been undertaken. Within the last two years we have begun the planting of yellow locust trees on an extensive scale on property owned by the company. The trees thus planted are seedlings two or three years old and cost, including labor of planting, about 8 cents each. Generally speaking, these are planted 10 ft. apart, thus averaging about 400 to the acre, although in the fall of 1904 we planted 54,871 trees 6 ft. apart and 88,127 trees 8 ft. apart. The total quantity planted to date is as follows:

		Totals.
Fall of 1902 at Newton Hamilton	13,610	
		13,610
" 1903 " Conewago	43,364	
		43,364
Spring of 1904 at Conewago	25,096	
" 1904 " Pomeroy	20,280	
" 1904 " West of Atglen	16,537	
" 1904 " Atglen	8,108	
		70,021
Fall of 1904 at Juniata bridge	20,730	
" 1904 " Newport	29,505	
" 1904 " Vintage	50,300	
" 1904 " Atglen and Susquehanna branch	53,000	
		153,535
Total		280,530

All of these places are in Pennsylvania.

During the coming year we expect to plant about 800,000 trees additional, say 200,000 in the spring and 600,000 in the fall. The land on which we planted these, except a tract of 14 acres at Newton Hamilton which was purchased for this particular purpose, are lands which the company has owned for some time and which were acquired in connection with old or new lines.

There is probably no other timber which combines so well the qualities of durability and hardness as does the yellow locust. Evidences of its longevity in use as tie timber are frequent on our road. The resistance of locust timber to cutting under the rail is said to exceed that of white oak and it has been demonstrated upon our main lines that it is not so much the decay of the timber as it is the cutting in by the rail, which wears out or decreases the life of the tie. The average life of a strictly white oak tie is about ten years—we expect to get longer life out of locust.

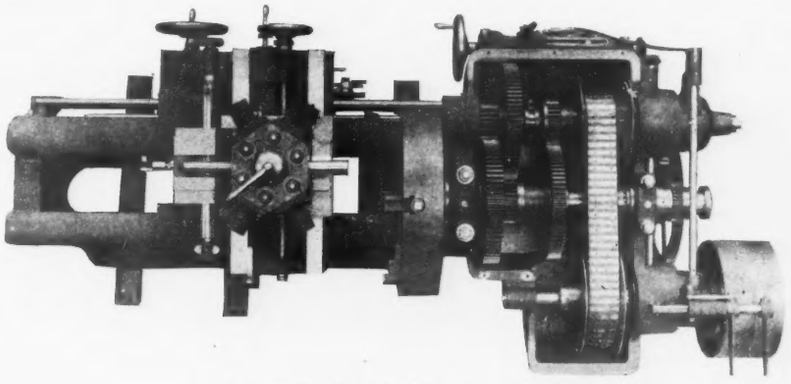
While it is not likely that the railroad company will at any time undertake to plant a sufficient number of trees from which to secure its entire supply of cross ties we feel that the experiment made by the railroad of raising its own tie timber will have a tendency to stimulate outside parties who are small owners of property to cultivate this class of timber and in this way assist the railroad company, in the vicinity in which they are located, by furnishing cross ties at some future time.

In order to supply our entire needs for the year—namely, 3,000,000 for repair and 500,000 for new work, and adding thereto 10 per cent. for the immediate future increase, making the total annual requirements 3,850,000 ties—we figure that three ties to a tree would require about 1,300,000 trees each year to produce the 3,850,000 ties and (figuring that it will require 50 years for a yellow locust to mature) would require a continuous growth of 39,000,000 trees, 1,300,000 to be planted each year, which, if planted 10 ft. apart or about 400 trees to the acre, would entail the continuous use of 97,500 acres or 152 square miles of ground for the purpose.

*From a paper by Joseph T. Richards, Chief Engineer of Maintenance-of-Way, of the Pennsylvania R. R., read before the American Forestry Association, Washington, D. C.

A New English Variable Speed Drive for Lathes.

The accompanying illustration shows an English automatic speed changing mechanism and variable speed drive for lathes designed by John Lang & Sons, of Johnstone, near Glasgow, Scotland. It is claimed that with this mechanism the correct surface speed is obtained, for every diameter however small the variation. By the use of the above device in connection with the automatic speed changing mechanism on surfacing and boring lathes the speed of the spindle automatically increses as the diameter being turned decreases, and thus for surfacing work, the tool is always cutting at practically a constant surface speed.



A New English Variable Speed Drive.

No counter-motion is required with this variable speed drive, as the fast and loose pulleys are on the headstock from which they are connected direct by belting to the main shaft or motor. To the shaft on which the fast pulley is fixed a pair of taper cones are keyed. These are connected by a specially designed belt to a similar pair of cones mounted on a parallel shaft as shown. This shaft in turn is connected by single and treble reduction through gears to the main spindle. An adjusting wheel is placed at the front of the machine by means of which the operator can get the correct speed for any diameter without having to handle the belt. An automatically operated index is also fitted to the machine, which shows the diameter being turned.

When the surfacing feed is in operation the saddle screw is connected by gearing to the hand-wheel shaft seen on the headstock so that when the slide carrying the tool moves toward the center of the lathe the revolutions automatically increase. When, however, the boring feed is in operation the speed of the lathe spindle remains constant. When the tool slide is moved out from or in towards the center by hand the spindle speed either increases or decreases, so that wherever the tool starts cutting the correct surface speed is used. When, however, the saddle is moved to or from the chuck by hand the spindle speed is constant.

Manufacturing and Business.

Bids are wanted March 28 by the Board of Water Commissioners at Atlantic City, N. J., for building a coal pocket, machine shop and tool house; also for coal elevating machinery. Kenneth Allen is Engineer in charge.

The Independent Railroad Supply Company, Chicago, has entered the electrical railroad field, having recently received an order from the Twin City Rapid Transit Company, Minneapolis, Minn., for Wolhaupter rail joints for 25 miles of track.

W. E. Bryant, Vice-President of the Michigan Lubricator Co., Detroit, Mich., received last week from one of the leading trunk lines of the country an order for 50 Michigan "Bull's-eye" lubricators. The order was given after extensive service tests.

The Yetman Transmitting Typewriter Company has completed its factory at Ilion, N. Y., and the works are now turning out Yetman typewriters, which work either as a typewriter or as a sender of "Morse" letters over a telegraph wire. The company reports a rapidly increasing business, and it has established offices in Pittsburg, Chicago, Washington, St. Louis and Kansas City.

The Hydrex Felt & Engineering Company has just started business at 120 Liberty street, New York City. This company will sell waterproofing materials, and will draw up plans and specifications and attend to the engineering details of this class of work. The manager of the new company is Edward

W. De Knight. The new company is an offshoot of the old-established concern of F. W. Bird & Son, East Walpole, Mass. The company starts business under favorable auspices, as "Hydrex" felt has been specified for the Pennsylvania tunnel under New York city, the B. & O.-Pennsylvania improvements at Washington, and for other important projects.

The Wykoff Pipe & Creosoting Company, Inc., Stamford, Conn., received an order from the Isthmian Canal Commission for 1,000 creosoted pine piles, for delivery at Colon.

Iron and Steel.

The new merchant bar mill of the Lackawanna Steel Co. was recently put in operation.

Contracts will soon be given by the New York Central for about 8,000 tons of bridge steel.

A contract has been given by the New York & New Jersey Railroad Company to the Bethlehem Steel Company for 25,000 tons of castings, to be used in the North River tunnel.

The Burnwell Coal Co., of Birmingham, Ala., is in the market for 8,000 ft. of 60-lb. rails or heavier; also for angle bars, tools, etc., and for tram cars with swinging dump doors. W. J. Francis is President, Chalifoux building, Birmingham.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies see advertising page 24.)

Canadian Society of Civil Engineers.

At the meeting of this society, March 9, a paper on "Electrical Resonance in Wireless Telegraphy," by John Stone Stone, was read.

New York Railroad Club.

At the next regular meeting of this club, to be held at Carnegie Hall March 17, the discussion on the paper presented at the January meeting on "Developments in Electric Traction," by W. J. Potter, will be continued.

Franklin Institute.

At a joint meeting of the Chemical Section and the Philadelphia Section of the American Electro-chemical Society held March 9, the programme included a paper on The Tonopah Mining District by J. E. Spurr, U. S. Geological Survey, Washington, D. C.; also one on New Methods in the Metallurgical Treatment of Copper Ores by N. S. Keith, New York.

Railway Storekeepers' Association.

The second annual meeting of the Railway Storekeepers' Association will be held at the Auditorium Hotel, Chicago, Ill., on Monday, May 22, convening at 10 a. m. Papers on the following subjects will be read: General Store-House—Does it Pay? Scrap: Handling at Shops and on Road; Crediting Same; Shop Time-Keeping; General Diffusion of Store Department Information, Casting Lists, Circulars, Etc.: Reclaiming of Wheels and Wheel Records.

PERSONAL.

—Mr. George R. Simmons, Acting General Manager of the Denver, Northwestern & Pacific, was born in Brooklyn, N. Y., in 1861. In 1878 he entered the station service of the Rome, Watertown & Ogdensburg, but the next year he went to Colorado, where he went to work for the Atchison, Topeka & Santa Fe, with which road he remained until 1881. He then went to the Denver & Rio Grande, remaining with that road in station service, train service and the motive

power department, until 1889, when he entered the office of Superintendent Ridgway, where he remained until 1896. He was then appointed general storekeeper of the Florence & Cripple Creek, and continued in that position until December, 1899. He then entered the service of the Florence & Cripple Creek District Railway as purchasing agent and chief clerk to the general manager. On January 1, 1903, he was appointed Purchasing Agent and Chief Clerk to General Manager A. C. Ridgway, of the Denver, Northwestern & Pacific Railway, and now succeeds Mr. Ridgway.

—Amos Caryl Ridgway, who has been appointed General Manager of the Denver & Rio Grande, was born at Delaware Water Gap, Pa., April 16, 1860, and is the son of R. M. Ridgway. In 1873 his father went to the Kansas Pacific, and the boy grew up a railroader. He remained with the transportation department of the Kansas Pacific until 1881, when he was appointed chief clerk to the chief engineer of the Missouri, Kansas & Texas, serving one year in that capacity. He then went to the Denver & Rio Grande, and in 1888 was appointed As-

sistant Superintendent of the Second and Third Divisions, which office he resigned June 1, 1896, to accept the position of General Superintendent of the Florence & Cripple Creek District Railway and associated companies. In 1899 he went to the Colorado Springs & Cripple Creek District Railway as General Manager, continuing in that position until July 1, 1902, when he was appointed Vice-President and General Manager of the Colorado-Utah Construction Company (Denver, Northwestern & Pacific Railway).

—Mr. B. C. Stevenson, who on March 1 was appointed Assistant General Freight Agent of the Toledo, St. Louis & Western, succeeding Thomas J. Cook, began his railroad career as a yard clerk for the Chesapeake & Ohio in 1890. In 1892 he resigned and went to the Baltimore & Ohio Southwestern, and thence to the Newport News & Mississippi Valley at Memphis. This position he left in 1894 and went to the B. & O. In 1898 he withdrew from railroad service and went to Chicago, where he followed the practice of law for one year, at the end of which period he accepted a position with the Toledo, St. Louis & Western.

—Mr. John Wilfred Higgins, the new Assistant General Manager of the Missouri Pacific, began his railroad service on the Toledo, Peoria & Western and the Illinois Central in 1879. He remained with the latter company until 1892 as track laborer, switchman, telegraph operator, brakeman, freight conductor, trainmaster and assistant superintendent. In June, 1892, he was made Superintendent of the Louisiana Division, and in 1893, was made Superintendent of Ter-

minals at New Orleans. From there he went to Chicago, and three years later was made Superintendent of the Amboy Division. Then for a few years he was Superintendent of Transportation, and in 1901 was promoted to be General Superintendent of Transportation. In September, 1903, he went to the Grand Trunk as Assistant Superintendent of the Eastern and Middle Divisons, but resigned the next year to go to the Missouri Pacific as Inspector of Transportation, from which position he is now promoted to be Assistant General Manager.

—Mr. M. F. Smearman, one of the most skillful draftsmen in the employ of the Pennsylvania Railroad, and the inventor of the first pneumatic ash hoist, with portable buckets located in the ash pit, died recently at Warren, Pa., aged 34.

—Mr. George Rice, the independent oil refiner, died at Asbury Park, N. J., on the first of March, at the age of 65. It was this Mr. Rice who so many times attacked the Standard Oil Company in the courts and before the Interstate Commerce Commission. He began his lawsuits about 20 years ago and has kept up the fight with great persistency.

—Mr. Roland C. Luther, Second Vice-President of the Philadelphia & Reading Coal & Iron Company, died at his home in Pottsville, Pa., March 6, at the age of 59. Mr. Luther was a mining engineer of marked ability. In 1888 he was promoted from the position of mining engineer of the above

named company to that of General Superintendent, and in 1902 was made Second Vice-President.

—Hon. John H. Reagan, of Texas, died at his home in Palestine, that State, on March 6, at the age of 86. Judge Reagan was Postmaster General in the Cabinet of the Confederate States, and was in Congress both before and after the war; and he was the author of the Reagan Bill, the precursor of the Interstate Commerce Law. In 1891 he resigned from the United States Senate to become Chairman of the Texas State Railroad Commission, and he held that office until about two years ago.

ELECTIONS AND APPOINTMENTS.

Alaska Central.—Frank Brown, hitherto Assistant Purchasing Agent of the Baltimore & Ohio Southwestern, has been appointed Purchasing Agent, with headquarters at Seattle, Wash.

Atchison, Topeka & Santa Fe.—F. B. Houghton has been appointed Assistant Freight Traffic Manager, with office in Chicago.

W. L. Essep has been appointed General Foreman of the Raton, N. Mex., shops.

Atlantic Coast Line.—E. L. Prince has been appointed Auditor of Freight Receipts, succeeding R. S. McIver, resigned.

Baltimore & Ohio Southwestern.—Frank Brown, Assistant Purchasing Agent, has resigned. (See Alaska Central).

Canadian Northern.—The office of W. A. Brown, Superintendent, has been removed from Port Arthur, Ont., to Winnipeg, Manitoba.

Canadian Pacific.—W. C. Bowles, hitherto Assistant General Freight Agent of the Western Division, with headquarters at Calgary, Alberta, has been transferred to Vancouver, and will be succeeded by G. H. Smith, hitherto Chief Clerk to W. R. MacInnes, Freight Traffic Manager at Montreal.

Central of Pennsylvania.—Wallace H. Gephart has been appointed General Superintendent, succeeding J. W. Gephart, deceased.

Chesapeake & Ohio.—C. P. Snow has been appointed Assistant Superintendent, with headquarters at Huntington, W. Va., succeeding C. R. Moriarty, resigned.

Chicago, Rock Island & Pacific.—H. J. Slifer, General Superintendent (Central District) at Chicago, has resigned. W. M. Hobbs, General Superintendent of Transportation, will temporarily discharge the duties hitherto discharged by Mr. Slifer.

Columbia, Newberry & Laurens.—H. M. Emerson has been appointed Traffic Manager, with office at Wilmington, N. C.

Florence & Cripple Creek.—E. F. Collier has been appointed Superintendent of Telegraph and Chief Despatcher, with office at Cripple Creek, Colo., succeeding H. F. Aller, resigned.

Houston East & West Texas.—Samuel Millican has been appointed Superintendent of Motive Power and Machinery, succeeding S. R. Tuggle, resigned.

Illinois Terminal.—B. B. Stakemiller has been appointed Engineer of Maintenance of Way, with office at Alton, Ill.; T. C. Moorshead, Chief Engineer, having resigned, the office of Chief Engineer has been abolished.

Jonesboro, Lake City & Eastern.—A. G. Palmer has been appointed General Freight and Passenger Agent of these companies, with office at Jonesboro, Ark., succeeding F. N. Boyer, resigned.

Leavenworth, Kansas & Western.—J. A. Munroe has been appointed Freight Traffic Manager; E. L. Lomax, General Passenger and Ticket Agent; J. M. Gruber, General Superintendent; J. B. Berry, Chief Engineer; John W. Griffith, Purchasing Agent, all with offices at Omaha, Neb., and A. J. Jung, Supervisor Bridges and Buildings, with office at Houston, Kan.

Niagara, St. Catharines & Toronto.—John Paul has been appointed General Freight Agent, succeeding W. N. Warburton, assigned to other duties.

Peoria & Eastern.—J. A. Barnard, General Manager, has resigned owing to ill health.

Pere Marquette.—H. O. Halsted, hitherto Superintendent of Telegraph, has been appointed Superintendent of Terminals at Chicago, succeeding W. S. Carson, resigned. W. K. Tasker has been appointed Superintendent of Telegraph, succeeding H. O. Halsted, promoted.

Southern.—A. M. Smith has been appointed Superintendent of the St. Louis Division, succeeding S. R. Kennedy, resigned. Office at Princeton, Ind.

Trinity & Brazos Valley.—Edward Hickman has been appointed Auditor, with office at Cleburne, Tex., succeeding H. H. Perry, resigned on account of ill health.

LOCOMOTIVE BUILDING.

The Chicago, Rock Island & Pacific has ordered 50 ten-wheel (4-6-0) and 10 switching (0-6-0) locomotives from the Baldwin Works.

The Wisconsin Central, as reported in our issue of January 13, has ordered seven compound freight locomotives and five Chautauqua (4-4-2) passenger locomotives from the Brooks Works of the American Locomotive Co.

CAR BUILDING.

The Wisconsin Central is reported to have ordered four chair cars.

The Chicago Southern has ordered 250 gondolas from Barney & Smith.

The Santiago de Chile has ordered three dining cars from the St. Louis Car Co.

The Chicago, Rock Island & Pacific is reported to have ordered 1,000 freight cars.

The Great Northern is reported to have ordered eight compartment observation cars.

The New York, New Haven & Hartford has ordered six coaches from the Pullman Co.

The Bangor & Aroostook has ordered six cabooses from the American Car & Foundry Co.

The Delaware & Hudson has ordered 150 steel underframe cars from the Pressed Steel Car Co.

The Chicago, Milwaukee & St. Paul has ordered 10 passenger cars from Barney & Smith.

The Minneapolis & St. Louis, it is reported, has ordered two passenger cars from the Pullman Co.

The Kansas City, Mexico & Orient is reported to have made contracts for $2,000,000 worth of passenger and freight cars.

The Kansas City Southern has ordered five 60-ft. baggage cars, four 60-ft. chair cars and four 60-ft. postal cars from the St. Louis Car Co.

The Greenwich & Johnsonville has ordered one combination passenger and baggage car 61 ft. long from the F. M. Hicks Co., of Chicago, for April 1 delivery.

The Atchison, Topeka & Santa Fe has recently placed orders for 1,500 box cars with the Standard Steel Car Co., 1,000 box cars with the American Car & Foundry Co., 650 dump cars with the American Car & Foundry Co., and 350 ballast cars with the Rodger Ballast Car Co.

The Maryland & Pennsylvania, as reported in our issue of March 3, has ordered 10 box cars of 60,000 lbs. capacity from the South Baltimore Steel Car & Foundry Co. for March 30 delivery. These cars will weigh 30,000 lbs., and measure 36 ft. 8 in. long, 8 ft. wide and 11 ft. 4 in. high from rail, with wooden frames and underframes. The special equipment will include Westinghouse air-brakes and Janney couplers.

BRIDGE BUILDING.

BATTLEFORD, N. W. T.—The Dominion Government is asking for bids for building the piers and abutments, also for the steel superstructure of a bridge to be built here.

CENTRAL CITY, NEB.—Bids are wanted March 21 by C. F. Newmyer, County Clerk, for building all the bridges that may be needed for one year in Merrick County.

CINCINNATI, OHIO.—Bids will soon be asked for building two double-track steel bridges on the Cincinnati Southern road between Cincinnati and Erlanger, Ky., to cost $200,000 and $125,000 respectively.

DES MOINES, IOWA.—The city council has ordered the construction of an extension to the Mehlan arch bridge at Sixth avenue which was recently built over the Des Moines river in North Des Moines. At least one more arch will be added and possibly two. Bids for this work are wanted March 18. For plans and specifications apply to the City Clerk.

HARRISBURG, PA.—Separate bids are wanted March 25 by J. M. Shumaker, Superintendent of Public Grounds and Buildings, for the substructure and superstructure of the bridge over the North branch of the Susquehanna river at Catawissa, Columbia County; for one over the Catawissa creek on Mill street, in Columbia County, and also one over the same creek in Beaver township.

KEYSTONE, IND.—Bids are wanted April 6 by C. S. Brineman, Auditor, Bluffton, Ind., for building an iron bridge 160 ft. long over the Salamony river in Wells County. Bids may also be asked at the same time for building 15 additional concrete bridges.

MANISTEE, MICH.—Bids are wanted March 30 by C. A. Gnewnch, City Clerk, for putting up an iron drawbridge over the Manistee river at Maple street and removing the present structure.

PAWNEE, OKLA. T.—Bids are wanted March 17 by C. R. Adams, County Clerk, for building two bridges over the Cimeron river in Pawnee County.

SANDWICH, ONT.—The committee on roads and bridges of the county council have recommended that a steel bridge be built over the Canard river at this place.

SASKATOON, N. W. T.—The Board of Trade has asked the Government for aid to build a combined railroad and traffic bridge here.

SMITHLAND, KY.—Bids are wanted April 5 by Thomas Evans, County Judge, for building a steel bridge over Phelps creek in Livingston County. A railroad bridge is to be built at this place over the Cape Fear river, which will be 700 ft. wide. G. W. Landram is interested.

SPRINGFIELD, MASS.—Bids will soon be asked for building the Boston & Albany bridge over the Connecticut river, to cost about $225,000.

SPRINGFIELD, ORE.—The Southern Pacific is planning to build a bridge over the Willamette at this place.

TORONTO, ONT.—City Engineer Rust has reported that the cost of a swing bridge at Queens Wharf to connect with the Island sandbar will cost about $200,000. The matter was referred to the Board of Works to take action.

The City Engineer recommends the raising of the Don river bridge at Queen street, and its extension. The bridge will be forked at the west and connect with both King and Queen streets, to cost about $100,000.

VANCOUVER, B. C.—A. B. Newell, manager

of the White Pass & Yukon Railway, states that it is the intention of the company to replace all wooden bridges with steel structures as soon as possible.

Warrenton, Mo.—Bids are wanted April 6 by A. W. Wehmeyer for building a steel bridge 124 ft. long over Charrette creek.

Other Structures.

Ardmore, Ind. T.—Work will be commenced about March 1 on the new passenger station of the Missouri, Kansas & Texas, for which an appropriation of $40,000 has been made.

Argentine, Kan.—A contract, it is reported, has been given by the Atchison, Topeka & Santa Fe to Charles Fellows, of Topeka, for building a large grain elevator to cost about $400,000 at this place.

Atoka, Ind. T.—The Missouri, Kansas & Texas, it is reported, has plans ready for building a new passenger station to cost about $40,000.

Birmingham, Ala.—A large bridge-building plant to cost about $300,000 will be put up in North Birmingham by the Birmingham Bridge Co. This is said to be a project of the American Bridge Co.

Cincinnati, Ohio.—Plans are reported completed and bids will soon be asked for the new freight house to be built by the trustees of the Cincinnati Southern for the Cincinnati, New Orleans & Texas Pacific on the site already secured at Vine, Plum, Commerce and Front streets. The building will be of concrete, brick and steel, with a frontage of 130 ft. on Vine street and a total depth of 1,200 ft., running back to Plum street.

Cleburne, Tex.—Bids are wanted March 6 by C. F. W. Felt, Chief Engineer of the Gulf, Colorado & Santa Fe, Galveston, Tex., for rebuilding the paint, the coach and the wood-working shops recently destroyed by fire at this place. They are to have brick walls, with frame roofs, and will be one-story high, 180 ft. wide and 340 ft. long, to cost $65,000. Work will be begun at once.

Dennison, Ohio.—Plans have been made by the Pennsylvania Lines for a new round-house and additional shops at Dennison, also yard improvements, the whole to cost approximately $300,000.

Des Moines, Iowa.—The Minneapolis & St. Louis, local reports state, will build a new freight house during the coming summer.

Dillon, Mont.—The Oregon Short Line, according to local reports, will put up a new passenger station to cost about $50,000, on which work will be commenced this month.

New Brighton, Pa.—The Pittsburg & Lake Erie has plans ready for a new brick freight and passenger station to cost about $18,000.

New Orleans, La.—The New Orleans Terminal Co., it is announced, will begin work at once on a permanent union passenger station at the intersection of Canal and Basin streets, the plan to put up a temporary structure having been abandoned.

Pueblo, Colo.—The Denver & Rio Grande, according to local reports, has definitely decided to build new roundhouses and shops at or near this place, at a cost of about $300,000.

Somerset, Ky.—The Cincinnati, New Orleans & Texas Pacific has announced that it will soon begin the building of new shops at this place and remove part of the plant now at Chattanooga. About $500,000 will be spent for these improvements.

Staunton, Va.—The Chesapeake & Ohio is planning to put up a new passenger station at this place.

Terrell, Tex.—A contract, it is reported, has been given for building the Texas Midland's shops at this place at about $25,000, to be completed June 1.

Toledo, Ohio.—The plans of the Wabash for the new union passenger station have been approved by President Ramsey and construction work will be begun at once. The building will be 480 ft. long and 60 ft. wide, with train sheds 800 ft. long.

Youngstown, Ohio.—The Erie and the Pittsburg & Lake Erie, it is reported, will jointly build a new brick and stone passenger station.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

Atlanta & Gulf.—This company has given notice that it will apply for a charter in Georgia to build a line from Atlanta to the Gulf of Mexico, 400 miles. The proposed route is through Campbell, Douglas and Heard counties in Georgia. The southern terminus has not been decided upon. F. A. Kuhn, Kennon Dearing and R. B. Beedles, of Atlanta, Ga., are interested.

Blackstone & Luneburg.—This company has been incorporated in Virginia with a capital stock of $50,000 to build a railroad from Blackstone, Nottoway County, southwest into Luneburg County. Freeman Epes is President, and T. M. Dillard, Secretary, Blackstone, Va.

Boston & Worcester (Electric).—This company will complete the double tracking of its line between Boston and Worcester by laying a second track on five miles of road between Southboro and Framingham, the only portion of single track which remains on the line. An extension of 1¼ miles into Natick will also be built at an estimated cost of $150,000.

Canadian Pacific.—An officer writes that construction work is under way on the following new lines: On the Pheasant Hills branch from Kirkella, near the western boundary of Manitoba northwest into Assiniboia, 29 miles of track were laid in 1904, from three miles east of Abernethy to two miles west of Lipton, making the total length of the branch 149 miles; on the extension from Lipton, 60 miles is partly graded. The connecting branch from Brookdale, Man., west to Varcoe, 16 miles, is already graded. The extension from Arcola, Assiniboia, northwest to Regina, 113 miles, is completed. On the branch east from Lacomb, Alberta, on the Calgary & Edmonton branch, 114 miles north of Calgary, 28 miles is graded. On the branch from Wetaskiwin, Alberta, on the Calgary & Edmonton branch, 152 miles north of Calgary, east to Battleford, 240 miles, 25 miles is graded.

Chicago, Milwaukee & St. Paul.—See Mineral Point & Northern below.

Colorado, Columbus & Mexico.—This company, reported in our issue of February 24 under the name of the Colorado, Columbus & Mexican, has been incorporated in New Mexico, with a capital stock of $5,000,000, to build from Salt Lake City, Utah, south through Marysvale, on the Rio Grande Western, to El Paso, Tex., with a later extension from El Paso to Monterey, Mex. A. O. Bailey, of Columbus, N. Mex., and J. G. Hilzinger, of El Paso, are among the incorporators.

Cumberland Railroad.—An officer writes that this company, which proposes to build a line from Artemus, Ky., on the Louisville & Nashville, south to Lunsford, 10 miles, has let the contract for the first 7½ miles of the line to Eddington, Griffiths & Co., of Knoxville, Tenn. A bridge will have to be built over the Cumberland river. C. W. Stone, of Warren, Pa., is President.

El Paso, Mountain Park & St. Louis.—An officer writes that this company, which is successor to the El Paso, Mountain Park & Oklahoma Central, has a capital stock of $6,000,000. Its offices are at Mountain Park, Okla., and Kansas City, Mo. The proposed line is from St. Louis, Mo., southwest through Springfield and Joplin, Mo., Wagoner and Okmulgee, Ind. T., and Oklahoma City and Mountain Park, Okla., crossing the Red river into Texas at Quanah, and thence through northwestern Texas to Roswell, in New Mexico, and on to El Paso, Tex. Then it is proposed to continue on across the States of Chihuahua and Sonora to the mouth of the Sonora river, on the gulf of California, 1,600 miles. Locating surveys have been made for 110 miles of the line. No contracts have been let, but the company intends to begin work this spring. On the 110 miles the maximum grade will be 0.8 per cent. and the maximum curvature 3 deg. R. K. Kelley is President, and Mark Roberts, Secretary.

Grand Trunk Pacific.—Charles M. Hays, President of this company, has made the following statement: "This new trans-continental line will consist of a main line of an estimated length of 3,500 miles, from Moncton, N. B., to a point on the Pacific ocean at or near Port Simpson, B. C. The 1,800 miles from Moncton to Winnipeg, called the Eastern division, will follow the most direct practicable route, passing through the city of Quebec, and will be built at the cost of the government of Canada. The 1,700 miles from Winnipeg to the Pacific ocean, called the Western division, will be built at the cost of and owned by the company. The company is also authorized to build branches, of which the most important is the Lake Superior branch, which will run from a junction with the Eastern division to a point on Thunder Bay, on Lake Superior, about 220 miles, and is, in reality, a division of the main line, as it is to form a chief link in the route for the products of the northwest to the point of shipment in lake steamers to the Grand Trunk System in the east via Lake Huron and Georgian Bay. The estimated cost of the construction of this branch is within $30,000 per mile, and it is planned to have it completed within three years from the beginning of construction. The Western division will be divided into two sections, the Prairie section, from Winnipeg to the Rocky Mountains, and the Mountain section, from the Rocky Mountains to the coast. The grades eastward on the Prairie section will be limited to a maximum of 21 ft. per mile. Estimates show that the cost of construction will be within $20,000 per mile, and that the line can be in operation within five years from the beginning of construction." (See Grand Trunk Pacific in Railroad Corporation News.)

Grassy Creek.—This company has been incorporated in West Virginia to build from Pickens, W. Va., to a point on the water shed between the Elk and Holly rivers. Among the incorporators are: J. H. P. Smith, of Parkersburg, W. Va.; J. H. Fisher and Fred L. Fox, of Sutton, W. Va.

Illinois, Iowa & Minnesota.—This road, which runs from Aurora, Ill., in a northwesterly direction to DeKalb, 28 miles, has put in operation an extension from DeKalb to Kirkland, 17 miles. (January 27, p. 3.)

Klondike Mines.—This company, which proposes to build a road from Dawson City, Yukon, via Grand Forks to the Stewart river, 84 miles, has completed 13 miles of its line from Dawson City to Grand Forks. The contractor for this was the Dawson, Grand Forks & Stewart River Railway Corporation, Ltd., of 2 Suffolk Lane, London, England. H. B. McGiverin, of Ottawa, is interested.

Linares & Gulf.—An officer writes that this road, which is being built by the San Carlos Copper Co. from Linares, Nuevo Leon, on the Mexican Central, via San Jose and Tamanlipas to the Gulf of Mexico, will be completed from Linares to San Jose, 40 miles, by July. Six miles of track is already laid. On the last 10 miles of the line, the work is very heavy. The road is to be standard gage, with masonry bridges and abutments. There will be steel girders on bridges under 23 ft. long. Frames of larger bridges will be creosoted. Edward D. Self is Chief Engineer. (September 9, p. 87.)

Long Island.—In connection with his letters to the public referred to in our issue of last week, President Potter states that the company is expending or plans to expend $40,000,000 on improvements, exclusive of the expenditures of the Pennsylvania in building the $40,000,000 tunnel of the Pennsylvania, New York & Long Island Railroad, under the Hudson and East rivers and Man-

hattan, and the New York Connecting Railroad, which will cost about $10,000,000 and will form a through connection by way of a bridge over Hell Gate and Ward's Island for the Long Island, the Pennsylvania and the New York, New Haven & Hartford. He says that by June 1, the Long Island expects to finish the electrification of 45 miles of road, including the line from Flatbush avenue to Queens and Belmont Park, from Woodhaven Junction to Rockaway Park, from Hammels to Valley Stream and from Valley Stream to Jamaica. This will be at a cost of $6,000,000. In addition, the company plans to electrify the North Shore branch to Whitestone Landing and to Port Washington from Long Island City, and the line from Long Island City to Manhattan Beach. The two principal improvements now under way are: (1) The elimination of grade crossings along Atlantic avenue, Brooklyn, from Flatbush avenue to Woodhaven Junction, and new terminal facilities at Flatbush avenue station, which will have cost, when completed, $5,000,000; and (2) the elimination of grade crossings and general improvements on the Bay Ridge line from East New York to Bay Ridge. The Bay Ridge line crosses 115 streets at grade, and this work, with the relaying of the light track with 100-lb. rails, will cost about $6,000,000.

LOUISIANA RAILWAY & NAVIGATION.—This road has been extended from Sarto, La., south to Naples, four miles.

LOUISVILLE & NASHVILLE.—A branch of the Knoxville division of this road has been completed and put in operation from Byington, Tenn., to South Dossett, 25 miles.

MCKEESPORT & CLAIRTON CONNECTING.—An officer writes that all franchises and rights of way have been secured for this road, which is projected to run from McKeesport, Pa., via Port Vue to Clairton, four miles, and that grading will be begun at McKeesport this month.

MEXICO & MICHOACAN.—The Mexican Government has granted a concession to this company to build a railroad from San Geronimo, in the State of Michoacan, easterly and northerly to the town of Apulco, on the Mexican Central, in the State of Hidalgo. The company also plans to build a line to the port of Tuxpan, on the Gulf of Mexico, and to build a number of extensions. Edmund Power is President; Jose Arce, Vice-President, and Leonides C. Bash, Secretary and Treasurer, all of the City of Mexico.

MEXICAN CENTRAL.—This company, it is reported, will build a short line to the port of Tampico, on the Gulf of Mexico. This line will extend from Apulco, State of Hidalgo, the terminus of the Apulco branch of the Panuco division, north to Tampico, 130 miles, and will greatly shorten the line of the road between Mexico City and Tampico, which at present is 780 miles. By the proposed line the distance would be about 240 miles.

MEXICAN ROADS.—Augustin Arroyo de Anda, a lawyer of the city of Mexico, is reported to have agreed to deposit $60,000 in Mexican Government bonds to guarantee the building of a railroad from Dolores Hidalgo, State of Guanajuato, on the National of Mexico, west to Guadalajara, 180 miles. The Mexican Government is said to have assured the necessary concession.

MIDDLETON & VICTORIA BEACH.—An officer writes that this company, which is to build an extension of the Halifax & Southwestern, has its line from Middleton, Nova Scotia, near Barrington Passage, north to Victoria Beach, 40 miles, all graded. MacKenzie, Mann & Co., Ltd., of Toronto, Ont., are the contractors. With the completion of the Halifax & Southwestern to Barrington Passage and the Middleton & Victoria Beach to Victoria Beach, there will be a total line of 236 miles from Halifax southwest to Liverpool and Barrington Passage, and from Barrington Passage northwest to Yarmouth and north to Victoria Beach.

MINERAL POINT & NORTHERN (CHICAGO, MILWAUKEE & ST. PAUL).—This line, which runs from Mineral Point, Wis., on the Chicago, Milwaukee & St. Paul, to Highland, 30 miles, has been opened for freight traffic. (September 2, p. 79.)

MISSOURI, ARKANSAS & SOUTHWESTERN.—This company has applied for incorporation in Arkansas with a capital stock of $2,000,000 and proposes to build a railroad from the Arkansas state line to Batesville, 70 miles.

MISSOURI RIVER & NORTHWESTERN.—An officer writes that this road, which is projected to run from Mystic, S. Dak., via Silver City and Pactola to Rapid City, 34.6 miles, has the first 26 miles under contract to Willis & Detwiler, and that construction will shortly be begun.

MOUNT HOOD.—This company has been incorporated in Utah with a capital stock of $250,000, of which $110,000 is reported subscribed by the incorporators. The purpose of the company is to build and operate railroads in the States of Washington and Oregon. William H. Eccles is President; Thomas D. Dee, Vice-President, and David C. Eccles, Secretary.

NATIONAL OF MEXICO.—This company, it is reported, will build a branch 25 miles long from Nuevo Laredo, State of Tamaulipas, to the coal fields of the Monterey Iron & Steel Co., of Monterey, near the Rio Grande river.

NEW YORK, ONTARIO & WESTERN.—An officer writes that the second track between Cornwall, N. Y., and Cadosia, 108 miles, is completed as follows: Burnside to Red Hill, 30.49 miles; Red Hill to mile post 98.50, 2.10 miles; mile post 103.50 to Centerville, .90 mile; Fallsburgh to Strongtown, 7.55 miles; Young's Gap to Rockland, 13.32 miles; Sundown to Cadosia, 15.86 miles; a total of 70.22 miles.

OWEN & NORTHERN.—A road is being built under this name from Ladysmith, on the Minneapolis, St. Paul & Sault Ste. Marie, southeast to Owen, on the Wisconsin Central, 50 miles, by McIntosh Bros., contractors, 506 Pabst Building, Milwaukee, Wis.

PAWNEE RAILROAD.—The Peabody Coal Co., which controls this road, has filed notice with the Secretary of State of Illinois of an increase in its capital stock from $120,000 to $2,500,000. The road, which now runs from Auburn, Ill., east to Pawnee, nine miles, will, it is reported, be extended from Pawnee east to Taylorville, 17 miles.

PENNSYLVANIA.—The new low-grade line on the west side of the Susquehanna river is finished. It runs from a junction with the Middle division near Marysville station, to a connection with the Baltimore division (Northern Central) 2½ miles north of Lemoyne, a distance of 5½ miles. It includes the Enola yard and the York Haven & Rowenna from its junction with the Baltimore division (Northern Central)at Wago Junction, 16.4 miles south of Lemoyne, to a junction with the Philadelphia division at Shock's Mills, 5.7 miles.

PENSACOLA & MEMPHIS AIR LINE.—This company has been incorporated in Mississippi to build a railroad from Memphis, Tenn., via Watervalley and Meridian, Miss., to Pensacola, Fla., 400 miles. Among the incorporators are: H. J. Forsyth, of Memphis, and J. W. Buchanan, Attorney for the St. Louis & San Francisco.

QUEBEC BRIDGE & RAILWAY CO. (INTERCOLONIAL).—An officer writes that this company's proposed line from a point on the Intercolonial to the St. Lawrence river, across the St. Lawrence river and into Quebec, 10 miles, is all under contract to M. P. Dovis, of Ottawa, Que. Grading is completed for two miles and one mile of track is laid.

RIO GRANDE VALLEY (ELECTRIC).—This company has filed articles of incorporation at Santa Fe, N. Mex., and proposes to build an electric line 65 miles long. The capital is $1,000,000. The names of the incorporators are not given.

ROCK CASTLE RAILROAD.—This company has been incorporated in Kentucky to build a railroad from a point in Lawrence County to a point in Martin County, a distance of about 75 miles.

SAN DIEGO EASTERN.—An officer writes that this company, incorporated in California with a capital of $10,000,000, proposes to build from San Diego, Cal., eastward to the Colorado River at Yuma, about 225 miles. The line has been surveyed and rights of way and franchises through the city of San Diego have been acquired. George W. Marston, San Diego, Cal., is President, John E. Boal is Vice-President, and L. L. Boone, Secretary. (November 25, p. 169.)

SAN PEDRO, LOS ANGELES & SALT LAKE.—The Frisco branch of the Salt Lake division of this road has been extended from Frisco, Utah, to Newhouse, seven miles. (June 10, p. 450.)

SEBASTIAN COUNTY (ELECTRIC).—An officer writes that this company, which proposes to build an electric road from Fort Smith, Ark., via Bonanza, Jenny Lind, Greenwood, Salem, Huntington, Mansfield, Prairie Creek and Midland to Hartford, 49 miles, will probably let a contract for the first section of the road to Michael Wallis and the Fort Smith Contracting Co., both of Fort Smith, Ark. Grading is completed for three miles. (See Construction Supplement.)

SOUTH BEND & SOUTHERN MICHIGAN.—An officer writes that this company, whose proposed road from South Bend, Ind., via Niles, Mich., and Berrien Springs to St. Joseph, 34 miles, is completed as far as Niles, 11 miles, proposes two extensions, one from Niles to Buchanan, six miles, and the other from South Bend to Chain Lakes, seven miles. Both of these have been surveyed. A. J. Hammond, South Bend, is Chief Engineer.

SOUTHERN.—This company is reported to be considering the double-tracking of its line from Greensboro, N. C., to High Point, and from Danville, Va., to Pelham, N. C. Surveys have been made.

SOUTHERN ILLINOIS (ELECTRIC).—An officer writes that surveys have been made and franchises and 75 per cent. of the right of way obtained for this electric road, which is projected from St. Louis via Belleville, Mascontah, Okawville, Hazleton and Irvington to Mount Vernon, Ill., 80 miles, with a branch from Irvington via Centralia, Central City, Sandoval and Odin to Salem, 20 miles. John R. Piercy, of Mount Vernon, is President.

ST. LOUIS & NORTH ARKANSAS.—This road, which now runs from Seligman, Ark., to Leslie, 130 miles, will, it is reported, build an extension from Leslie to Settlement, 25 miles.

TIDEWATER.—The City Council of Norfolk, Va., has voted to appropriate $95,000 to secure a right of way 13 miles long from the Southern branch of the Elizabeth river to Sewall's Point for this projected road. President W. N. Page, of the company, has advertised for bids, to be closed April 15, for the grading and masonry on 20 sections of the road, covering a distance of 100 miles west from Sewall's Point. This road is projected to run from Norfolk west across the State of Virginia to a point at the mouth of the East river, where Mercer County, W. Va., joins Giles County, Va. From this point, under the name of the Deepwater road, it will run to Deepwater, W. Va., on the Kanawha river, a total distance of about 350 miles. The road will parallel the Norfolk & Western to the West Virginia state line.

TOLEDO, COLUMBUS & CINCINNATI (ELECTRIC).—An officer writes that this company, incorporated in Ohio, proposes to build an electric road from Toledo south via Lima and Columbus to Cincinnati, 250 miles, and expects to begin construction in the spring. E. C. Schumess is President, and T. A. Wright, Secretary, Spitzer Building, Toledo, Ohio.

TOLEDO & MICHIGAN (ELECTRIC).—An officer writes that this company's proposed line from Adrian, Mich., via Clayton, Hudson, Hillsdale, Jonesville and Quincy to Coldwater, 56 miles, is all under contract.

Grading is completed from Adrian to Hudson and from Jonesville to Coldwater, a total of 35 miles. P. P. Duket, Adrian, Mich., may be addressed.

VIRGINIA & KENTUCKY.—This road, which runs from Wise, Va., to Gladeville Junction, four miles, has been extended from Virginia and Kentucky Junction to Norton, Va., one mile.

WALKERTON & LUCKNOW.—This company has applied to the Dominion Parliament for authority to build from Hanover, Ont., through Durham to a point between Martindale and Dundalk; also from Lucknow to Wingham and from Teeswater to Kincardine. The application is reported to have been made in the interest of the Canadian Pacific.

WELLINGTON & POWELLSVILLE.—This road, which runs from Ahoskie, N. C., to Windsor, 24 miles, has been extended from Windsor southward to Plymouth, 29 miles.

WEST VIRGINIA & IRONTON.—A company by this name has been incorporated in West Virginia. It is reported to have been formed in the interest of the Norfolk & Western, which plans, under the name of this new company, to straighten its line between Vivian, W. Va., and Naugatuck, 92 miles.

RAILROAD CORPORATION NEWS.

ATLANTIC COAST LINE.—Lee, Higginson & Co., of Boston, are offering at 97½ and interest $500,000 of 4 per cent. certificates of indebtedness of the Atlantic Coast Line Co. of Connecticut, due Jan. 1, 1925, subject to redemption at par and interest on any interest day after Jan. 1, 1910. The authorized issue is $5,000,000, of which $2,869,000 is outstanding. No mortgage can be placed upon the property without the consent of the holders of two-thirds of the outstanding debenture certificates. By ownership of a majority of the capital stock of the Louisville & Nashville, this company controls a system of over 10,000 miles in the south.

CANADIAN NORTHERN.—Sperling & Co., of London, have offered at 92 $3,000,000 additional 4 per cent. perpetual consolidated debenture stock. The proceeds of the new issue are stated in an advertisement to be particularly for the equipment and maintenance of the extensions recently made and now building. On June 30, 1903, the company's operated mileage was 1,276 miles, which has been increased to 1,579 miles. It is anticipated that by the time the Edmonton and Prince Albert extensions are opened for traffic in the autumn, the mileage in operation will be over 2,000 miles.

CHESAPEAKE & OHIO.—This company's statement for the seven months ending January 31 shows net earnings of $4,446,739 in 1905 against $3,803,698 in 1904. The percentage of expenses to earnings for this period was, in 1905, 63.3 per cent., against 66.4 per cent. in 1904.

COLORADO & SOUTHERN.—This company has applied to the New York Stock Exchange to list $8,500,000 first preferred stock, $8,500,000 second preferred stock, and $31,000,000 common stock. This is the formal step in the exchange of the voting trust certificates for the original stocks and does not involve the issue of any additional securities.

DELAWARE, LACKAWANNA & WESTERN.—Joseph Walker & Sons, of New York, having purchased the $473,000 first refunding 3½ per cent. bonds of the Warren Railroad due August 2000, issued to take up consolidated 7 per cent. bonds due March 1, will receive the latter bonds in exchange at par and interest for the old, and 102½ and interest for the new bonds.

GRAND TRUNK PACIFIC.—Charles M. Hays, President of this company, has made the following statements in regard to the financial arrangements for the road: "The Eastern division of this projected transcontinental line, is to extend from Moncton, N. B., to Winnipeg, Man., 1,800 miles. It will be built at the cost of the government of Canada, and on completion will be leased to the Grand Trunk Pacific for 50 years on the following terms: For the first seven years the company is to operate the line subject only to the payment of working expenses; for the next 43 years, the company is to pay annually to the Canadian Government, by way of rental, a sum equal to 3 per cent. per annum on the cost of construction. If, however, in any one or more of the first three years of this period of 43 years, the net earnings over and above working expenses shall not amount to 3 per cent. of the cost of construction, the difference between the net earnings and the rentals shall not be paid by the company, but shall be capitalized and form a part of the cost of construction, upon the wnole amount of which rental is to be paid, at the rate of 3 per cent. per annum after the first 10 years of the lease and during the remainder of the 50 year period. The items to be included in the cost of construction and the expenditures thereon are to be the subject of agreement between the company and the government. The company reserves running rights for a period of 50 years after the expiration of the 50-year lease. The Western division, which is to extend from Winnipeg to the Pacific coast, will be built by the company, but the Canadian Government will guarantee first-mortgage bonds to the extent of $13,000 per mile on the Prairie section from Winnipeg to the Rocky Mountains, and three-quarters of the cost per mile of the Mountain section, from the mountains to the Pacific coast, the remaining cost of the line to be provided for by bonds guaranteed by the Grand Trunk Railway of Canada. In addition to the guarantee by the Canadian Government on the bonds of the Mountain section, the government will pay interest thereon for the first seven years from the date of issue without having recourse to the company for any interest so paid."

Speyer Bros., through their London office, and the Dominion Securities Co., of Toronto and Montreal, have received subscriptions for about ten times the amount of the $15,020,000 4 per cent. mortgage sterling bonds of 1955 of this company, consisting of $8,230,000 of series A (Prairie section) bonds and $6,790,000 of Lake Superior branch bonds, guaranteed unconditionally by the Grand Trunk Railway of Canada.

(See Grand Trunk Pacific in Railroad Construction.)

ILLINOIS CENTRAL.—This company's statement for the seven months ended January 31 shows an increase in gross earnings of $2,273,017, a decrease in operating expenses and taxes of $401,516, and an increase in net earnings of $2,674,533 over the same period a year ago.

KANSAS CITY SOUTHERN.—E. H. Harriman, speaking for the voting trustees, has made the following statement: "In view of the termination of the voting trust by limitation on April 1 next, the voting trustees have determined not to exercise the right of electing the next board at the statutory meeting on March 14, but to adjourn said meeting for about 60 days, in order meantime to enable the holders of voting trust certificates to exchange such certificates into actual stock, so that at the adjourned meeting the board may be elected by the stockholders instead of by the voting trustees."

LOUISIANA & ARKANSAS.—The report of this road, which at present runs from Hope, Ark., southeast to Jena, La., 175 miles, for the seven months ended January 31 shows gross earnings of $476,943, against $371,408 for 1904; operating expenses and taxes of $295,203, against $287,603 in 1904, and net earnings of $181,740, against $83,805 in 1904. Deducting fixed charges, this leaves as surplus $119,597, against $28,221 in 1904.

NATIONAL OF MEXICO.—This company's statement for the year to December 31 shows gross earnings of $11,569,248, operating expenses of $7,704,672, and net earnings of $3,864,576 for 1904. This compares with net earnings of $3,709,430 for 1903. The mileage operated increased from 1,558.7 in 1903 to 1,599.61 miles in 1904.

NEW ORLEANS RAILWAYS.—The New York Trust Co. announces that nearly 85 per cent. of the bonds, 75 per cent. of the preferred stock and 60 per cent. of the common stock has been deposited under the reorganization plans described in our issue of February 10. The time during which deposits will be received has been extended to March 10.

NEW YORK, NEW HAVEN & HARTFORD.—The formal transfer of the Greenwich Tramway and the Stamford & New York Electric Railway to the New York, New Haven & Hartford is reported to have been made. The lines of these two electric roads aggregate about 50 miles. They extend from Stamford, Conn., west to New Rochelle, N. Y.

NEW YORK, PENNSYLVANIA & SOUTHWESTERN.—Allison, Meldrum & Co., of New York, are offering at 95 and interest the unsold portion of the authorized issue of $4,500,000 first-mortgage 50-year 5 per cent. gold bonds of this company, which is building a road from Williamsport, Pa., northeast to Binghamton, N. Y., 116 miles, and owns coal fields in Pennsylvania. The contract provides for having the road in operation on or before Dec. 31, 1905.

PENNSYLVANIA.—The report of this company for the month of January shows an increase in gross earnings for the lines directly operated of $836,900, and an increase in net earnings of $607,300; and for the lines west of Pittsburg and Erie, an increase of $796,500 in gross earnings and $308,400 in net.

PEORIA & PEKIN TERMINAL.—E. H. Gay & Co., of New York, are offering at par and interest $140,000 refunding mortgage 30-year gold bonds. These are part of an authorized issue of $2,000,000, of which $700,000 is reserved to retire a similar amount of first-mortgage 5 per cent. bonds. The total amount of bonded debt outstanding is $840,000. The new issue, as a whole, is subject to call at 105.

PERE MARQUETTE.—The stockholders, at the meeting held on February 27, ratified the 999 year lease of the road to the Cincinnati, Hamilton & Dayton.

SOUTHERN.—This company's statement for the seven months ended January 31 shows gross earnings of $28,660,948, compared with $26,771,135 in 1904, an increase of $1,889,814. Expenses and taxes increased from $19,021,063 in 1904 to $20,262,050 in 1905, an increase of $1,240,987. This leaves an increase in net earnings for the period in 1905 of $648,827.

SOUTHERN PACIFIC.—Notice has been given to the holders of the two-five years 4½ per cent. gold bonds of the Southern Pacific Company that they will be redeemed at par and interest on June 1, on which date interest on these bonds will cease, at the office of the company in New York.

TEXAS & PACIFIC.—Notice has been given to the holders of the Eastern division first mortgage bonds dated May 15, 1875, that the bonds will be redeemed at par at the office of the Mercantile Trust Co., in New York City.

TOPEKA RAILWAY (ELECTRIC).—E. H. Rollins & Sons, of Boston, and the American Trust & Savings Bank, of Chicago, are offering the unsold portion of this company's outstanding $1,000,000 first-mortgage 5 per cent. gold bonds of 1930. This company's line consists of 32 miles of standard-gage electric road in Topeka, Kan., of which seven miles is double track. The city allows the company to carry heavy freight between 12 midnight and 5 a.m.